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## Marketing Loans Induced Acreage Expansion in U.S. Dry Peas

The 2002 Farm Act signaled a new era within the U.S. dry edible pea and lentil industry by initiating a Federal loan program for producers. The program, known as the Marketing Loan Program, assures producers of an effective grower price not lower than the loan rate, thereby reducing market risk. Prior to the policy change, chronically low world prices, a limited domestic market, inconsistent commercial export markets, and a lack of processing and handling facilities outside of the Pacific Northwest limited dry edible pea and lentil production. The price protection offered by the marketing loan program, however, was expected to lead to rapid expansion in planted acreage for dry peas, which are a high-protein food for both humans and livestock. As anticipated, area planted to U.S. dry edible green and yellow peas soared from 206,800 acres in 2001 to a record-high 925,500 acres in 2006.

In 1997, Washington and Idaho were the top producing States, producing high-quality dry peas and lentils destined largely for food use. Dry peas were planted outside the Pacific Northwest mainly for agronomic benefits in crop rotations. By 2004, these two States were dwarfed by rapidly rising output in North Dakota and Montana. The lower cost of production (abundance of inexpensive land and ability to use standard machinery) in the upper Midwest favors production of dry peas (many of which are lower cost feed grade), while growers in Washington and Idaho enjoy consistently higher quality and easier and cheaper access to shipping channels.

To evaluate the impact of the Marketing Loan Program, ERS developed an acreage response model that operates as a system of acreage allocation decisions for dry peas and important alternative

crops. Empirical analysis of data for 2003-05 indicates that marketing loans were key in the expansion of dry pea acreage in North Dakota and Montana beyond that induced by market forces.

Because the domestic dry pea food market is small (less than 1 pound per person per year) and the domestic dry pea feed market is both small and as yet undeveloped, the industry has turned to the highly competitive world market to sell much of the additional production induced by marketing loans. As a result, U.S. dry pea export volume quadrupled between 2002 and 2005. Commercial shipments to India, Spain, and Cuba have increased since the early 2000s.

Shipments to Canada from the upper Midwest have also increased due to the weaker dollar and the proximity of some U.S. growers to Canadian dry pea dealers and processors. Canada, as the leading exporter of dry peas, has expressed concern that U.S. dry pea marketing loans are trade distorting. However, ERS analysis indicates that marketing loans had negligible impacts on world dry pea prices and only minor impacts on U.S. export volume.  $\mathbb{W}$

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**This finding is drawn from . . .**

*The Impacts of Marketing Loans on Supply Response and World Trade for U.S. Dry Peas and Lentils*, by William Lin and Gary Lucier, ERR-58, USDA, Economic Research Service, June 2008, available at: [www.ers.usda.gov/publications/err58/](http://www.ers.usda.gov/publications/err58/)




## ERS and Collaborators Model Foot-and-Mouth Disease Outbreaks

Maintaining the competitiveness of U.S. livestock and poultry in domestic and international markets requires addressing the challenges and anticipating the disruptions of disease threats. Despite some successes in eradicating livestock diseases (contagious bovine pleuropneumonia, 1892; foot-and-mouth disease (FMD), 1929; screwworms, 1959; hog cholera, 1978), the United States finds itself continuously challenged by known and newly emerging threats, both foreign and endemic. Bovine Spongiform Encephalopathy (BSE, or mad cow disease) is one disease that has recently been targeted by U.S. prevention and mitigation systems.

Among the tools in the ongoing battle against livestock diseases are models that simulate disease outbreaks and their economic effects. These models help measure the economic impacts of alternative control strategies. A new modeling tool integrates epidemiological simulations from a North American Animal Disease-Spread Model (NAADSM) developed by USDA's Animal and Plant Health Inspection Service with an economic model developed at Purdue with ERS collaboration. This integrated framework can be used to assess effects of a disease outbreak and subsequent mitigation efforts on livestock supply, demand, and trade for up to 20 calendar quarters.

A purely hypothetical outbreak of FMD in small Midwest hog operations was simulated to assess the effect of mitigation strategies and impacts of export embargoes for beef, beef cattle, hogs, and pork. Even though few animals had to be destroyed in the

simulation, many agricultural sectors suffered losses. However, domestic meat supplies increased, lowering prices for domestic consumers. Total losses to livestock-related enterprises from the hypothetical FMD episode ranged between \$2.8 billion and \$4.1 billion, depending on disease intensity, the outbreak's duration, and the response scenario. In 2007, losses in that range would have represented 2 to 3 percent of forecast livestock cash receipts. In the simulations, the swine and pork sectors recovered soon after export restrictions ended, but beef and cattle effects lingered due to the longer cattle production cycle. Production of all commodities returned to pre-disease levels in less than 2 years.

The framework is flexible and can be applied to many livestock diseases. It allows the integrated modeling of both economic effects and disease-spread effects from an outbreak; it can assess the effects of a disease outbreak on major agricultural sectors, along vertical market chains, from production to consumption; and it can project the impacts of the disease outbreak, by quarter, for 5 years. 

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**This finding is drawn from . . .**

*Economic Impacts of Foreign Animal Disease*, by Philip L. Paarlberg, Ann Hillberg Seitzinger, John G. Lee, and Kenneth H. Mathews, Jr., ERR-57, USDA, Economic Research Service, May 2008, available at: [www.ers.usda.gov/publications/err57/](http://www.ers.usda.gov/publications/err57/)



Ken Hammond, USDA

## Lower Income Households Spend Additional Income on Foods Other Than Fruit and Vegetables

On average, Americans do not consume enough fruit and vegetables, despite the recommendations outlined in the *Dietary Guidelines for Americans*. The discrepancy between actual and recommended consumption is even larger for low-income households. They score below higher income households on healthy eating indices that range from 10 for full compliance with dietary recommendations to zero for no consumption. Households earning below 185 percent of the poverty line scored below those with incomes at or above this level on indices for whether enough fruit (about 3.5 versus 4) and vegetables (about 5.5 versus 6.3) are being eaten.

What if lower income households had additional resources? Would they spend more on fruit and vegetables? Food expenditures and food consumption are closely, though not perfectly, correlated. Food expenditures reflect quantities purchased as well as quality. Thus, a higher level of expenditures could reflect an increase in either the quantity or the quality of fruit and vegetables being consumed.

### Food expenditures vary by income level

	Income below 130 percent of poverty line	Income between 130 and 500 percent of poverty line
At-home foods		
	<i>Per person weekly spending, 2003 dollars</i>	
Bread and baked goods	2.22	2.67
Dairy foods	2.42	3.03
Fruit	2.06	2.67
Beef	1.66	1.98
Frozen prepared foods	0.90	1.03
Vegetables	1.99	2.39

Notes: In fiscal year 2003, the poverty line was \$18,660 per year for a family of four with two related children under age 18.

All differences in expenditures between the two income groups are statistically significant at the 10-percent level.

Source: Analysis by USDA, Economic Research Service, of the Bureau of Labor Statistics' 2003 Consumer Expenditure Survey.



Hayden Stewart, USDA/ERS

An ERS analysis of the 2003 Consumer Expenditure Survey looked at how small adjustments to lower income households' buying power would affect their food spending. Households earning below 130 percent of the poverty line spent less money than other households on several types of foods bought for at-home consumption, including beef, dairy products, fruit, vegetables, bread and other baked goods, and frozen prepared foods. For example, these households spent 23 percent less on fruit and 17 percent less on vegetables than wealthier households.

The analysis found that households with incomes less than 130 percent of the poverty line will spend additional income on needs other than fruit and vegetables. Among the foods examined, the lowest income households were more likely to spend a small increase in income on beef and frozen prepared foods. These foods may be priorities over fruit and vegetables because of taste and convenience.

As incomes rise, households allocate additional income across a wider variety of foods. For households earning between 130 and 185 percent of the poverty line, some portion of a small increase in income will likely be spent on fruit and vegetables. Among such households, a 10-percent increase in income prompts a 1.2-percent and 1.9-percent increase in fruit and vegetable expenditures, respectively.  $\mathcal{W}$

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### This finding is drawn from . . .

*Are Lower Income Households Willing and Able To Budget for Fruits and Vegetables?* by Hayden Stewart and Noel Blisard, ERR-54, USDA, Economic Research Service, January 2008, available at [www.ers.usda.gov/publications/err54/](http://www.ers.usda.gov/publications/err54/)

*The Healthy Eating Index: 1999-2000*, by P. Basiotis, A. Carlson, S. Gerrior, W. Juan, and M. Lino, CNPP-12, USDA, Center for Nutrition Policy and Promotion, December 2002.



## Almonds Lead Increase in Tree Nut Consumption

Americans increased their consumption of tree nuts by 45 percent between the mid-1990s and mid-2000s, with almonds being among the favorites. Promotional programs that advertise the nutritional value of nuts, including beneficial levels of vitamin E and omega fatty acids, have likely contributed to the upswing in per capita nut consumption. The trend toward healthier eating has also played a role, along with the increasing popularity of Mediterranean and Middle Eastern foods that contain nuts. Strong domestic and international demand for U.S.-grown tree nuts has helped keep prices up despite increased production.

The ERS food availability data provide estimates of the food available for consumption and are a proxy for consumption, particularly for understanding trends over time. During 2001-06, nut availability was sufficient to provide each American with an average of 1 pound of almonds per year, 1 pound of "other nuts," a half pound each of walnuts and pecans, a third of a pound of hazelnuts, and a fifth of a pound of pistachios. "Other nuts" are those that are primarily imported rather than domestically produced and include cashews, brazil nuts, chestnuts, pine nuts, and many nut mixes. Cashews make up the largest share of this category.



PhotoDisc

Actual nut consumption is likely higher because nuts in imported foods are not reported in the availability data.

While nut consumption has generally trended upward since 1995, the annual data for tree nuts show spikes and deep valleys largely because of production cycles. Nut trees are alternate bearing, meaning that they produce a large crop one year followed by a much smaller one the next year as the trees replenish their nutrients. Generally, the cycles bring big swings in crop size. Producers have learned to moderate some of these swings in crop size by increasing planted acreage and yields through improved production and management technologies. To compensate for off-year production, nut companies and major users, such as confectioners and ice cream manufacturers, build inventories during peak bearing years to try to maintain a steady annual supply.  $\mathcal{W}$

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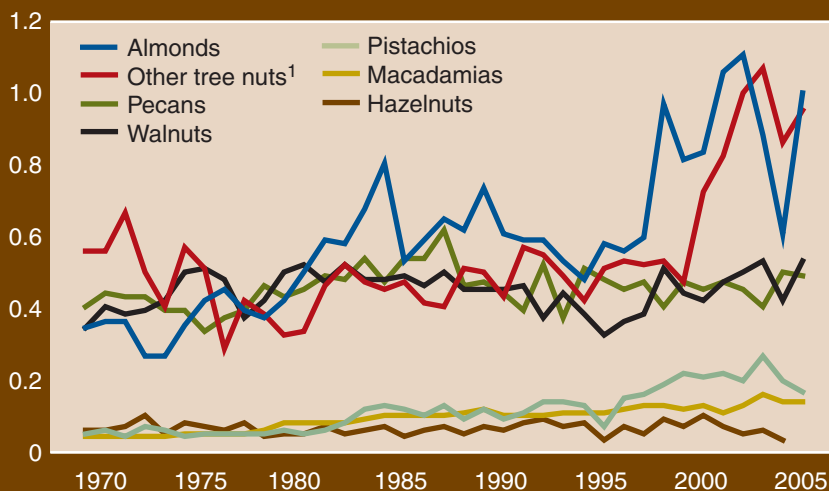
Susan L. Pollack, [pollack@ers.usda.gov](mailto:pollack@ers.usda.gov)

For more information . . .

ERS Food Availability (Per Capita) Data System, available at: [www.ers.usda.gov/data/foodconsumption/](http://www.ers.usda.gov/data/foodconsumption/)

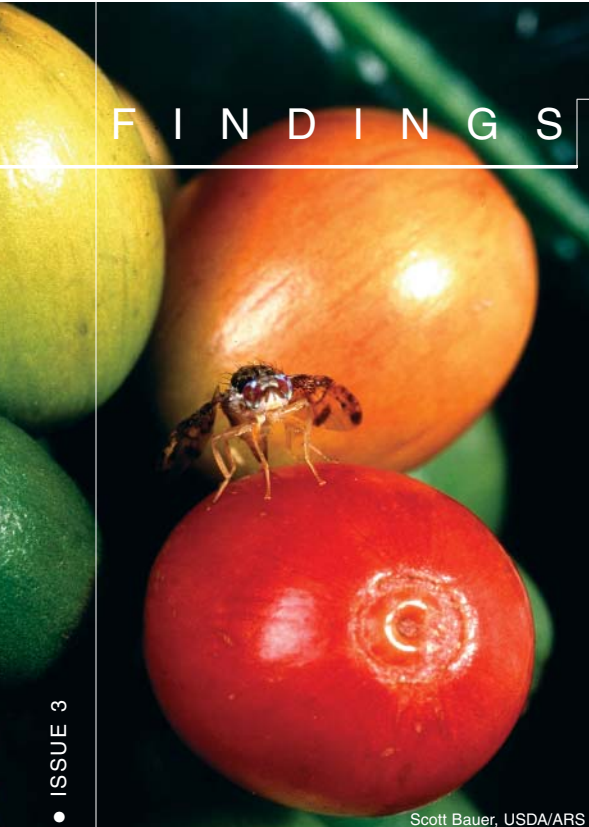
### Americans consuming more tree nuts since 1995

Pounds per person per year



<sup>1</sup>"Other tree nuts" are mostly cashews but also include brazil nuts, chestnuts, pine nuts, and mixed nuts.

Source: ERS Food Availability (Per Capita) Data System, 2008.



Scott Bauer, USDA/ARS

## Pest Problems Abroad May Affect Compliance With U.S. Safeguards

Ninety-five percent of Mediterranean fruit fly (medfly) outbreaks in the continental United States since 1929 have occurred in Florida and California. USDA, along with California's and Florida's departments of agriculture, use preventive release programs to reduce the severity and frequency of outbreaks. Millions of

sterile male fruit flies are released weekly where outbreaks have occurred. If a wild, fertile female medfly is nearby, she is likely to mate with a sterile male, produce eggs that do not hatch, and be unable to mate again.

Medflies are known to exist in 65 countries that export fresh produce to the United States. Because female medflies lay their eggs inside the produce, USDA regulates fresh produce importation to reduce the rate of new invasions. Among the approved and commonly applied ways to eliminate medfly larvae is cold treatment: refrigeration at a mandatory average temperature for a specific time period.

Live medflies were confirmed in separate shipments of clementines from Spain in 2001, prompting USDA to amend regulations governing their importation and the cold treatment of fresh produce from all known medfly regions. Subsequent analysis by USDA's Animal and Plant Health Inspection Service suggested that the specified duration of treatment may not have achieved satisfactory control; therefore, USDA extended the required length of the treatment time.

Using a simulation model, ERS examined treatment schedules that maximize

U.S. produce consumers' and producers' net benefits from efforts to control fruit fly outbreaks. In the model, a representative foreign producer exports a fraction of production to the United States and the remainder to the rest of the world, and implements medfly controls to maximize profit. If medflies survive pesticide sprays and cold treatment abroad, as well as the domestic preventive release program, an outbreak causes domestic yield losses and production cost increases in the U.S.

The results of the analysis show that the economically optimal number of days to treat imports increases with the severity of medfly outbreaks abroad. The optimal treatment schedules are very similar to current treatment schedules. The treatment period that maximizes foreign producer profit also varies with the severity of outbreaks. When local infestations are at or below average, the results suggest that economic incentives abroad are consistent with U.S. policy. However, when local infestations are above average, foreign producers have an economic incentive to treat their produce below the U.S. optimal level. This occurs because yield losses and control costs increase with the severity of outbreaks to the point where profit is maximized at a treatment level lower than the U.S. optimal level. The disparity between U.S. goals and foreign producers' incentives shows the importance of monitoring compliance with cold treatment regulations and provides justification for USDA's practice of doing so.  $\mathbb{W}$

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### This finding is drawn from ...

"The Mediterranean Fruit Fly and the United States: Is the Probit 9 Level of Quarantine Security Efficient?" by Michael Livingston, in *Canadian Journal of Agricultural Economics*, 55(2007):515-526.

### Optimal cold treatment schedules for medfly infestations may differ from treatments designed to maximize foreign producers' profits

Medfly outbreak severity abroad	Optimal treatment for United States		Optimal treatment for representative foreign producer	
	Days	$^{\circ}F$	Days	$^{\circ}F$
Below average	8	32.5	9	32.5
Average	11	32.5	11	32.5
Above average	12	33.0	11	32.5

Source: Livingston, M. J. "The Mediterranean Fruit Fly and the United States: Is the Probit 9 Level of Quarantine Security Efficient?" *Canadian Journal of Agricultural Economics*, 55 (2007):515-526.





Lynn Betts, USDA/NRCS

## Soil Conservation Preserves Reservoir Benefits Nationwide

Over 75,000 reservoirs in the 48 contiguous States provide recreation, scenic beauty, flood control, fish and wildlife habitat, water supplies, hydroelectric power, and other benefits. But over time, sediment settling to the bottom of reservoirs reduces their water-holding capacity and the quality of benefits they provide. Agricultural runoff is a major source of reservoir sediment in many areas of the country. Sediment washed from fields moves down streams and settles in lakes and reservoirs. Therefore, steps to reduce soil erosion on the Nation's farms and ranches can protect the benefits provided by reservoirs.

A recent analysis by ERS estimates that the value of a 1-ton reduction in agricultural soil erosion and the subsequent reduction in reservoir sedimentation is as high as \$1.38 per ton. The analysis provides per ton benefit values for all of the 2,111 watersheds in the 48 contiguous States. Benefit values across the country vary because of site-specific differences in the physical

effects, that is, the quantity of sediment deposited due to a 1-ton change in soil erosion, and the value people place on changes in reservoir benefits. In general, as the number of reservoirs within a watershed increases, physical effects increase. As the size of the population affected in a region increases, the total value of benefits increases. Consequently, benefit values tend to be higher in the East.

The ERS estimates of the benefits of soil conservation, in terms of their impact on reservoirs, are derived from two models. The first links changes in soil erosion to changes in reservoir sedimentation, using data on reservoir characteristics, sedimentation rates, and erosion rates. The second model links changes in the value of reservoir benefits to changes in reservoir sedimentation and is estimated with data on reservoir characteristics and, indirectly, dredging costs. The analysis estimates a benefit model using cost data because it is reasonable to assume that the benefits of dredging a reservoir are sufficient to at least cover dredging costs.

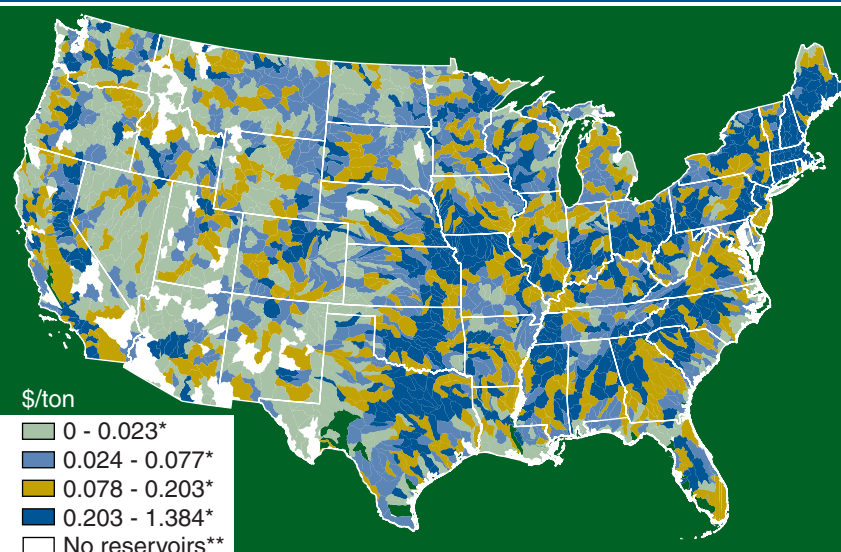
Although estimates of the benefits of a 1-ton reduction in erosion amount to less than \$0.20 per ton in 80 percent of the watersheds, the total value of soil conservation with regard to reservoir benefits is substantial. For example, through a variety of public and private initiatives, soil erosion in 1997 was 640 million tons less than in 1982. The public benefit for the subsequently lower level of reservoir sedimentation is estimated to be \$154 million. Of course, this is just one of many soil conservation benefits.  $\mathcal{W}$

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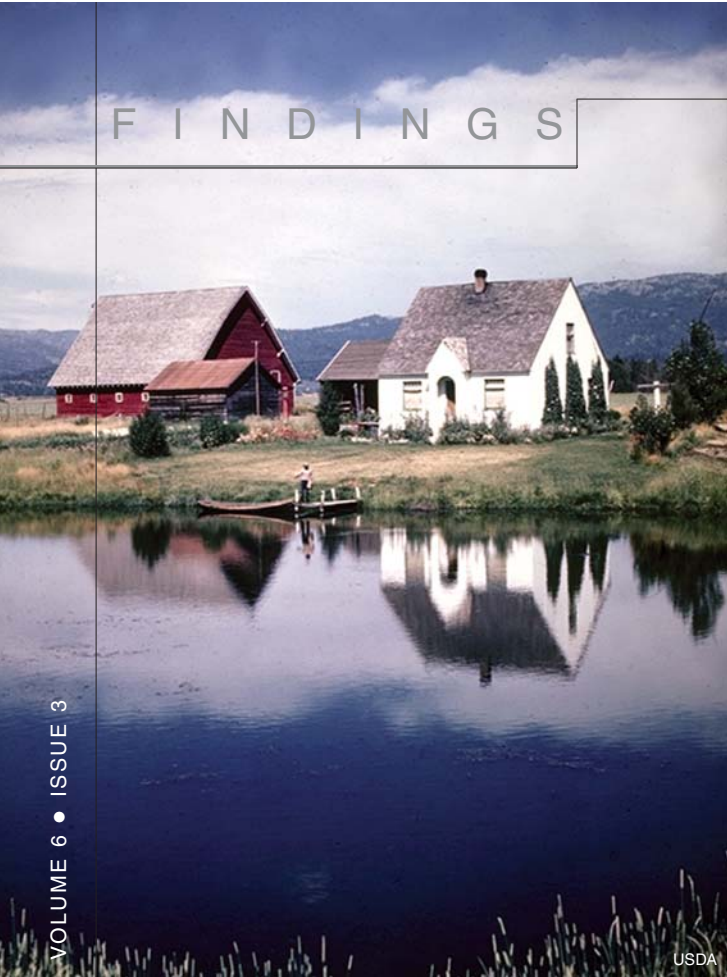
**This finding is drawn from . . .**

"The Value of the Reservoir Services Gained with Soil Conservation," by Leroy Hansen and Daniel Hellerstein, in *Land Economics*, 83(3) (August 2007): 285-301.

### Benefits of a 1-ton reduction in soil erosion to protect reservoirs are higher in the East



\*Approximately 487 watersheds in each range.  
 \*\*165 watersheds with no reservoirs.  
 Source: USDA, Economic Research Service.



USDA

## A Look at the Economic Well-Being of Farm Households

Average farm household income has consistently exceeded that of all U.S. households for more than a decade. Nonetheless, nearly 12 percent of farm households were classified as poor in 2004, based on the official U.S. definition of poverty, only slightly less than the 12.6

percent of nonfarm households considered poor in 2004. However, the income measure used to determine how "poor" a household is may not capture variations in economic well-being among farm households as well as it does among nonfarm households. In particular, a broader definition of well-being may better account for annual variation in farm income and the potential stabilizing effect from the sizeable farm assets held by many farm households.

Using data from USDA's 2004 Agricultural Resource Management Survey, ERS researchers developed a comprehensive measure of economic well-being that combines pre-tax income with an

estimate of the potential income stream provided by a farm household's marketable wealth (i.e., that portion of a household's assets that can be easily converted to cash if necessary). When adjusted for family size, this composite measure recognizes the role that accumulated wealth can play in helping households cope with temporary swings in household income—a phenomenon particularly com-

mon among farm households (see "Income an Incomplete Measure of Farm Household Well-Being," June 2007 issue of *Amber Waves*). Nearly 22 percent of farm households are classified as "lower income and lower wealth" based on composite income levels of less than half of the farm household median.

ERS examined the characteristics of these lower income and lower wealth farm households to determine what differentiates them from their "higher income and higher wealth" counterparts. For many farm households, participation in government farm programs and in off-farm work represents viable strategies to mitigate the impact on household economic well-being of agricultural risks resulting from variations in market prices, pest infestations, weather, and other factors. Participation in farm programs and/or in off-farm work reduces the likelihood of a farm household being categorized as lower income and lower wealth based on ERS's composite measure of household economic well-being. Less than half of farm households receive farm program payments in any given year. On average, most farm household income derives from working off the farm.

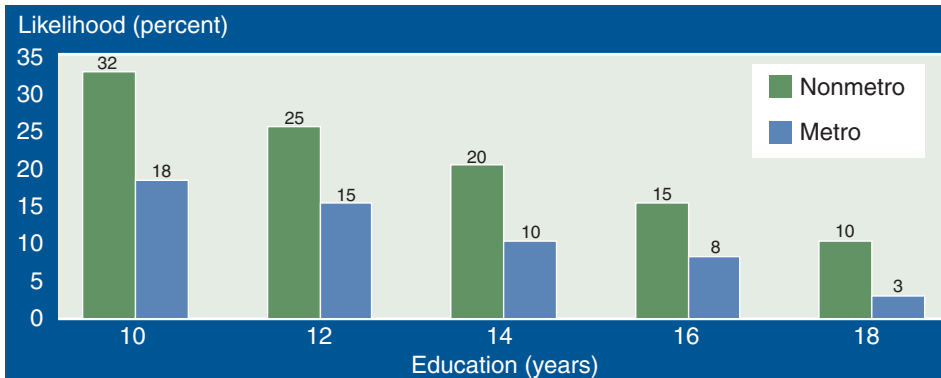
ERS also examined whether other factors affected the economic well-being of farm households. Findings indicate that the likelihood of the household being lower income and lower wealth is reduced when the farm operator has more education, is White, is married with no children, or is age 45 or older. The importance of education was more pronounced for farm households located in metro areas than in nonmetro areas.  $\mathcal{W}$

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**This finding is drawn from . . .**

"Determinants of Poverty Among U.S. Farm Households," by Hisham El-Osta and Mitchell Morehart, in *Journal of Agricultural and Applied Economics*, 40, 1 (April 2008): 1-20.

### Education and metro farm location reduce the likelihood of a farm operator household being "lower income and lower wealth"



Source: Simulation results based on estimates from a regression model using data from USDA's 2004 Agricultural Resource Management Survey.



## Farm Size Behind Regional Differences in Hog Output and Productivity

In recent years, there have been substantial geographical shifts in hog production and differences in hog farm productivity growth rates. ERS research indicates that changes in farm size explain much of this regional variation.

The Heartland and Southeast regions (see table footnotes for definitions) together account for three-quarters of U.S. feeder pig-to-finish hog production. Between 1992 and 1998, hog farms in the Southeast and other regions grew at a faster rate than farms in the Heartland. As a result, hog production shifted from the Heartland to the Southeast and other

regions. Between 1998 and 2004, the average size of hog farms in the Heartland doubled, while farms in the Southeast grew at a slower rate (though starting from a larger base). As a result, the Heartland's share of hog output grew 10 percentage points while the Southeast's share declined.

Policy changes at the State level help explain the Southeast's decline in output share and farm size growth rate. Farms in North Carolina produce, on average, over 90 percent of hog output in the Southeast. In 1997, North Carolina passed the Clean Water Responsibility and Environmentally

Sound Policy Act, which imposed a moratorium on the construction or expansion of new or existing hog operations with 250 or more head. Exceptions included new construction using "innovative animal waste management systems that do not employ an anaerobic lagoon." North Carolina extended the moratorium several times through 2007 and passed legislation that strictly regulates manure management systems.

Regional changes in feed productivity (hog output per unit of feed) display a similar pattern to output share. From 1992 to 1998, farms in the Southeast attained larger increases in average feed productivity than did farms in the Heartland. Between 1998 and 2004, this pattern reversed, with average feed productivity in the Heartland more than doubling.

ERS research indicates that trends in total farm productivity, which aggregates the productivity of all major inputs, mirrored trends in farm output and feed productivity. Productivity increased more in the Southeast between 1992 and 1998 and more in the Heartland between 1998 and 2004. These regional differences in productivity growth since 1992 are explained mostly by different rates of growth in farm size (larger farms operate at a more efficient scale of production) rather than different rates of technical innovation. Consequently, policies to regulate hog enterprise expansion, like the North Carolina moratorium, can have an indirect, but adverse effect on productivity growth.  $\forall$

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**This article is drawn from . . .**

*The Changing Economics of U.S. Hog Production*, by Nigel Key and William McBride, ERR-52, USDA, Economic Research Service, December 2007, available at: [www.ers.usda.gov/publications/err52/](http://www.ers.usda.gov/publications/err52/)

### Hog farm size explains regional differences in productivity growth

	1992	1998	2004
		<i>Percent</i>	
Share of feeder pig-to-finish output			
Heartland	58	35	45
Southeast	20	32	25
Other regions	22	32	30
		<i>Hundredweight (cwt) gain per farm</i>	
Average farm output			
Heartland	1,700	5,400	11,300
Southeast	2,300	20,800	25,100
Other regions	1,100	10,500	13,000
		<i>Cwt gain per cwt feed</i>	
Feed productivity			
Heartland	0.29	0.31	0.76
Southeast	0.28	0.44	0.63
Other regions	0.24	0.31	0.63

Note: Regions are defined by States: Heartland (IA, IL, IN, KY, MO, and OH); Southeast (AL, AR, GA, NC, SC, and VA); and other regions (CO, KS, MI, MN, NE, OK, PA, SD, TN, TX, UT, and WI). Hundredweight gain equals hundredweight of hogs sold or removed under contract less hundredweight of hogs purchased or placed under contract, plus hundredweight of inventory change each year.

Source: USDA, Economic Research Service, using data from USDA's 1992 Farm Costs and Returns Survey and the 1998 and 2004 Agricultural Resource Management Surveys.



# Who Will China Feed?

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An interview with the authors is featured  
online at: [www.ers.usda.gov/amberwaves/](http://www.ers.usda.gov/amberwaves/)





- China is a net food exporter, and its food exports, as well as its imports, are growing.
- China's capacity to continue food export growth is constrained by intense competition for limited resources by nonagricultural industry and other sectors of the economy.
- Intensive use of chemical inputs has led to deteriorating environmental quality, which may affect China's future production capacity and cause problems in export markets.

In the 1990s, many analysts saw China as a major potential market for agricultural exports from the United States and other countries. Lester Brown's highly publicized 1995 book, *Who Will Feed China? A Wake-Up Call for a Small Planet*, predicted that China would turn to international grain markets to meet the expanding food demands of its increasingly affluent population. World Trade Organization (WTO) accession was expected to be a watershed event that would finally open the Chinese market to grain and meat imports.

While China has emerged as the world's leading importer of soybeans, vegetable oil, cotton, wool, rubber, and animal hides, it has been surprisingly successful at meeting the basic food needs of its population of more than 1.3 billion people, and it has stepped up as a major food exporter. How long can China sustain this momentum?

China imports only small amounts of premium-grade rice, minor amounts of wheat in most years, and no corn. China has maintained agricultural self-sufficiency in grains as it carries out the world's largest and fastest urbanization and industrialization. Economic development is increasing competition for scarce resources in China, but growing incomes are allowing most consumers to increase consumption of fruit, vegetables, and livestock products.

China has become a significant food exporter by ramping up production in many sectors and gaining world market share. Indeed, China has been a net food exporter for most of the last three decades. China dominates world markets in a variety of products areas, including garlic, apples, apple juice, mandarin oranges, farm-raised fish and shrimp, and vegetables. At times, it

seems that China has suspended the law of scarcity by boosting production in many sectors and selling at low prices without having to sacrifice production in other sectors.

More recently, however, signs hint at a restoration of the law of scarcity, mostly in the form of rising commodity and input prices, more expensive labor, restrictions on land developments, and a reversal of China's pro-export policies. Various hidden costs of China's seemingly miraculous growth also are beginning to emerge, including dangerous chemical residues on food and related food safety problems, falling groundwater tables, polluted water, and overall environmental degradation.

### **China's Challenge: Feeding 1.3 Billion People**

For centuries, China was an agrarian economy mostly populated by small subsistence farmers. In the 1930s, John L. Buck, a Professor of Agricultural Economics at Nanjing University, estimated that plant-based foods comprised 97 percent of Chinese caloric intake, and this diet enabled farmers to maintain subsistence livelihoods on a limited land base. In the 1950s, China's agriculture underwent collectivization, and even though China's population doubled from 550 million in 1950 to over 1 billion by 1980, the country was still largely able to maintain food self-sufficiency during most of this period. Key to this achievement was the continuation of plant-based diets for much of the population, as the centrally planned and collectively run mobilization of land, water, and labor resources for agriculture was directed toward production of food grains at the expense of livestock and horticultural products.

In the late 1970s, China introduced reforms that effectively ended collective agriculture and restored traditional household production. Farm income grew and diets diversified during the 1980s and 1990s. Agricultural production gains stemmed from gains in production efficiency rather than expansion and mobilization of additional resources. The immediate effect of these reforms was a decline in area sown to grain and an increase in land devoted to nongrain crops and livestock production. Still, despite the decrease in area, grain production surged as farmers allocated their limited resources more efficiently.

Over the past two decades, the role of the market has expanded and fostered rapid economic growth in China. Everwealthier consumers began diversifying their diets to include more variety in fruit and vegetables and more livestock and fish. China Ministry of Health statistics indicate the share of calories consumed from grain and vegetable products in 2002 was 63 percent, far below the 97 percent estimated in the 1930s.

Farmers responded to changing domestic demand for food products by further diversifying production. At the same time, Chinese farmers have supplied a growing stream of food exports that include farm-raised fish, shrimp, vegetables, fruit, juices, mushrooms, tea and organic foods. But the rapid growth of livestock and horticultural production did not come at the expense of reduced grain output. After years of regional and local self-sufficiency enforced under collective agriculture, yields continually improved over the post-reform period, the result of stronger incentives, improved production practices, more regional specialization, and the introduction of new varieties.

Investments in research and development raised the quality of inputs and the efficiency of their use over the past two decades. Research into improved varieties

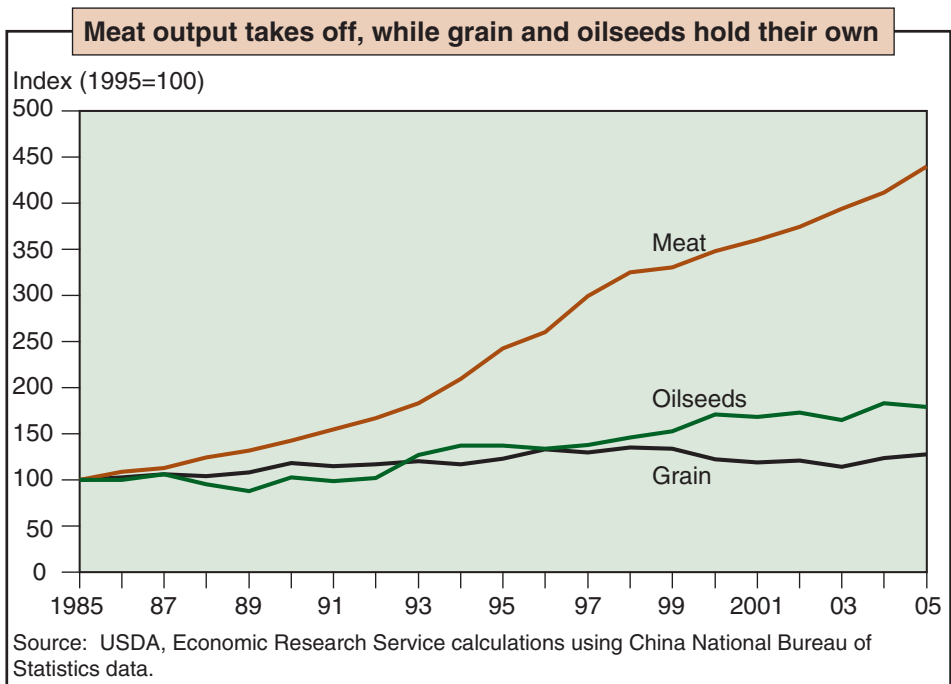
and quality of seeds surged after the late 1970s. By the turn of the century, China had more agricultural researchers than any other country, and a larger budget for public sector agricultural research than any developing country. Fertilizer quality in China also has improved over the past two decades, as farmers move away from applying pure nitrogen fertilizer to applying more nitrogen-phosphorous-potassium blends. China has been importing breeding animals—which are often crossed with domestic breeds—to improve efficiency of weight gain, improve disease resistance, and raise milk output. The government has offered subsidies to farmers for dairy herd improvement for several years.

China today is the world's largest agricultural producer and consumer. With an estimated 10 percent of world land resources and 6 percent of world water resources, China produces 30 percent of the world's rice, 20 percent of the world's corn, a fourth of the world's cotton, an estimated 37 percent of the world's fruit and vegetables, and half of the world's pork. For most products, China's world

share of production is close to or exceeds its 20-percent share of world population. China, however, has exploited the means of coaxing food and fiber out of a limited natural resource base to the extent that additional gains will be more difficult than in the past.

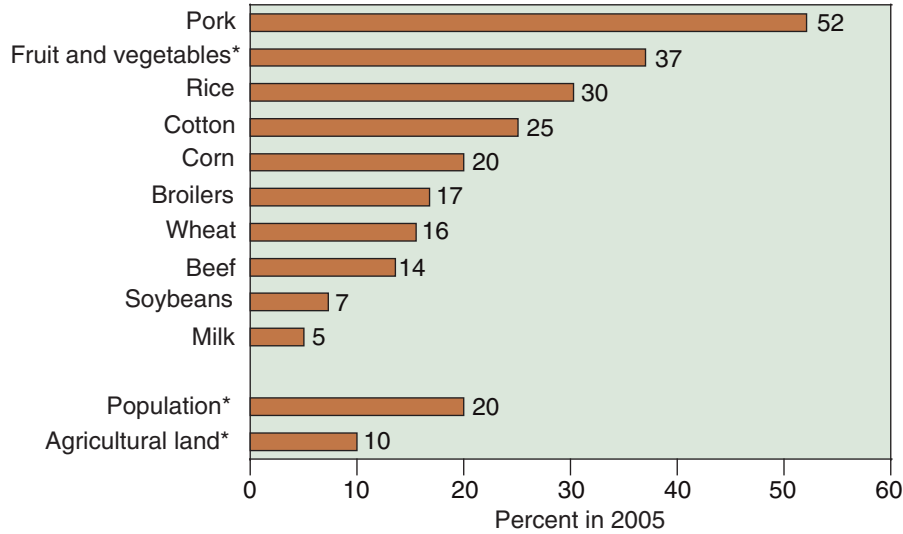
**Signs of Stress to Land and Water**

Land and water are key inputs to agriculture and are the main constraints to China's continued production growth. Chinese farmers farm not only the most productive land in plains and valleys in the eastern third of the country but also steep hillsides, arid grasslands, drained lakes, and dry riverbeds that are generally not cultivated in more land-abundant regions like North America or Australia. While southern China has relatively abundant water that facilitates water-intensive flooding of rice paddies, the per capita water endowment in the North China Plain is roughly one-tenth the world average and is well below conventional measures of water scarcity. Yet, this region produces a large share of China's wheat,





**China produces over half the world's pork output and a third of world horticultural output**



\*Based on United Nations Food and Agriculture Organization data.  
Source: USDA, Economic Research Service calculations using USDA data except where noted.

corn, cotton, and other crops that rely heavily on irrigation.

China's current exploitation of land and water resources is either at or beyond sustainable levels. The cultivation of steep hillsides is causing massive sedimentation loss estimated at over 2 billion tons per year, decreasing productivity in areas losing topsoil, reducing water storage capacity in reservoirs, and increasing the likelihood of floods. Agricultural practices, both crop cultivation and animal husbandry, on sensitive arid grasslands are partly to blame for the desertification of these areas. In the North China Plain, the groundwater table is falling rapidly in some areas, and several surface-water sources periodically dry up before reaching the sea. The Yellow River, for example, ran dry for long periods of the year in the 1990s. Policy measures instituted in 2000, however, have ensured the river's continued flow to the ocean.

Industrial and urban growth is increasing the competition for China's limited land and water. China's nonfarm economic boom means that housing com-

plexes, industrial parks, power stations, and other projects, are being built on land converted from agriculture. Competition for land within agriculture is also intense. Increasing production of meat, dairy products, vegetables, fruit, and farm-raised fish competes with grain cultivation for area. Given the gradual shrinkage of the agricultural land base, expansion of one agricultural activity generally means that land must be diverted from another. Efforts to develop saline or other marginal lands for limited agricultural activities have yet to result in significant expansion of agricultural production onto such land.

As with land, water resources face increasing demand from nonfarm users. In 1980, industrial and domestic consumers used only 13 percent of the water consumed in China, with agriculture accounting for the remainder. By 2000, agriculture use was roughly two-thirds of water consumed in China, and industry and domestic users have raised their share to one-third. On the productive North China Plain, water diversions for human use are well over 60 percent of renewable

water resources, and nearly 90 percent in the Hai River Basin in Hebei Province.

While China intensively uses its land and water resources in agriculture, there is potential to manage both resources more efficiently. Land in China is allocated to farm households but remains collectively owned and subject to redistribution to other households or sale to nonagricultural interests by local leaders. This system reduces incentives for households to invest in land improvement and raises the cost of land transfers. It also results in small, fragmented household land holdings that confound farmers' capacity to specialize or take advantage of economies of scale and size. Additionally, farmers rarely allow land to be fallow and recover from intensive production, a practice that could have negative long-term implications for land productivity. Until the 1990s, water management in China was geared to exploiting water as a cheap resource to boost agricultural and industrial production without considering the opportunity costs. Efforts to encourage water saving are just beginning to take hold.

Reforming land and water management policies and practices in China may help improve the efficiency of resource allocation and could bring about more sustainable practices and contribute to future production growth. However, such reforms are likely to confront ideological and other resistance. Moreover, the gains may not have a large net effect on agricultural production since more efficient allocation may lead to a reduction in the levels of land and water allocated to agriculture. This is particularly true for grains, since the value of these resources in grain production is lower than in horticultural production and nonagricultural uses.

**Signs of Labor Scarcity**

China has been able to maintain low-cost production in international agricultural markets largely because of low

labor costs. Historically, Chinese farms have raised large amounts of output from small plots by using labor-intensive production strategies, such as growing multiple crops per year, intercropping, and growing vegetables in courtyards. But hundreds of millions of rural workers have found nonfarm employment over the last two decades. The flow of labor from rural areas enabled China's industry and cities to boom, while wage growth was relatively stagnant for much of the last two decades.

China's rapid economic expansion appears to have finally exhausted the pool of under-employed workers. Since 2003, wages have been rising at a double-digit pace. The dwindling pool of available rural workers is resulting in increased mechanization of harvesting and planting. Anecdotal evidence also suggests that intensive agricultural practices, like double-cropping, transplanting seedlings by hand, and small-scale hog production, have decreased due to labor shortages and high wages.

### Food Prices Are Rising

The recent trends in resource use, labor availability, and changing agricultural production, along with rising international food prices, are causing increases in China's domestic food prices. Food prices in China began rising in 2006, and China's government made controlling the inflationary impact of food prices a top policy concern in 2007. Pork prices in China soared to record levels in 2007 as the hog sector contracted, in part due to disease outbreaks and inclement weather in southern China. In previous cycles (as recently as 2004-05), sharp increases in prices drew more producers into hog production. But in 2007, response to the record-high prices was slowed by disease losses and the high cost of feed and feeder pigs. Ultimately, officials resorted to introducing subsidies and insurance as incentives to encourage hog production and hasten the easing of prices. Recent policies aimed at boosting grain planting have diverted land from soybean and rapeseed production, and oilseed and vegetable oil prices rose sharply in the last 2 years.

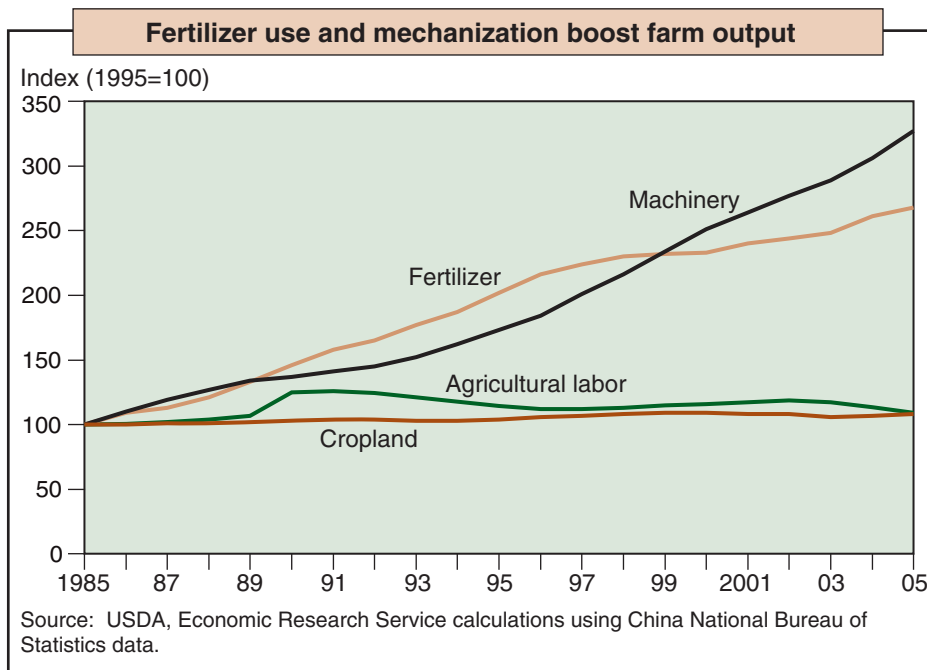


Fred Gale, USDA/ERS

Prices are rising partly due to increasing world commodity prices, but also because of China's inability to boost domestic production. In response, China has made several significant policy changes in the last year. The Chinese government withdrew rebates of value-added taxes that encouraged exports, and it introduced temporary export taxes on grain and flour to cut off grain exports and cool domestic grain prices. Also in the past year, China scaled back ambitious policies to retire environmentally sensitive land from cultivation, and it revised plans to develop grain-based bio-fuel production.

### Hidden Costs Now and in the Future

In addition to having an impact on the production costs borne by farm households, applications of agricultural chemicals and exploitation of natural resources can have external costs borne by others or by future generations. These costs are becoming more evident in China. As education and access to news improves, Chinese consumers are growing more concerned about the quality of the environment and the food they eat, and are seeking changes. In a 2007 survey of household food consumption choices in Beijing, far more households reported choosing food products according to quality and safety attributes than according to price.







Tom Wahl

Chinese farmers have applied heavy doses of chemical fertilizer and pesticides to overcome natural resource constraints and significant pest pressures. Farmers use a variety of veterinary drugs to control diseases that spread quickly among livestock and fish raised in crowded facilities, and they use feed additives to enhance animal growth. Residues of toxic pesticides, drugs, and industrial pollutants detected in food are a potential health hazard. A sizeable share of China's industrial production also takes place in rural areas and in close proximity to agriculture. The external costs of industrial production, such as water pollution, often are borne by agricultural producers.

China's food industries have been stung by quality and safety problems both overseas and in domestic markets. There is a strong campaign to reduce and regulate farm chemical use. Chinese officials now ban food production in heavily polluted areas and limit use of toxic chemicals. Exporters must go through stringent certifications and product testing, raising the costs of production and limiting the development of potential export markets for food products. Chemical fertilizer and animal waste also contribute significantly to water pollution and may be constrained by environmental regulations.

## The Future of Agricultural Production and Trade in China

China's sheer size and relatively open trade policies ensure that it will continue to be a major importer and exporter of agricultural products. However, rising prices and increasing attention to environmental and food safety problems in 2006-07 seemed to signal the end of "easy" growth. In coming decades, China's agricultural export juggernaut might be slowed as it faces resource and labor scarcities and confronts environmental and food safety costs that were not always taken into account during the decades of robust growth. Slower export growth, coupled with growth in domestic consumption, may shift the food industry's attention toward supplying the domestic market.

While future gains in China's agricultural production will not come as easily as in the past, there is still scope to achieve further growth. Indeed, the United States and many other countries have faced similar resource and environmental constraints and still maintained robust growth in agricultural production while transitioning into more environmentally friendly production practices. China, however, is developing at a much more rapid pace than other countries, has a very large and diverse agricultural sector, and has yet to fully establish supporting institutions to facilitate this transition while increasing the efficiency of production.

China is establishing policies to maintain production growth and reduce the environmental impact of agricultural practices. Research institutes are developing new crop varieties and production systems that could increase yields and use water more efficiently. The livestock industry is importing breeding stock and developing larger scale commercialized operations to improve the efficiency of livestock production. Agricultural officials

in China are promoting demonstration projects in more sustainable modes of agricultural production. China is strengthening farmers' rights to land—although stopping short of allowing full ownership of land—so farmers can rent land, consolidate their holdings, and achieve efficiencies in size and scale. Moreover, agricultural officials seek to band small farms together into "production bases" to supply uniform products to selected agribusinesses which, in turn, supply farmers with standardized inputs, technical information, and production credit.

Changing consumption patterns will play an important role in China's future agricultural trade. As Chinese consumers diversify their diets, aggregate consumption of traditional food grains, such as rice and wheat, is flat or declining. Some land historically used to grow food grains is being shifted to feed grains to support the growing livestock sector. Finally, China's fruit and vegetable production will continue to grow and, over time, food safety issues will likely be resolved. However, a large share of the increases in the production of these products will be consumed by China's own large and increasingly wealthy population.  $\mathbb{W}$

### This article is drawn from . . .

*Demand for Food Quantity and Quality in China*, by Fred Gale and Kuo Huang, ERR-32, USDA, Economic Research Service, January 2007, available at: [www.ers.usda.gov/publications/err32/](http://www.ers.usda.gov/publications/err32/)

"The Ongoing Reform of Land Tenure Policies in China," by Bryan Lohmar, Keith Wiebe, and Agapi Somwaru, in *Agricultural Outlook*, September 2002, available at: [www.ers.usda.gov/publications/agoutlook/sep2002/ao294f](http://www.ers.usda.gov/publications/agoutlook/sep2002/ao294f)

# FOOD STAMPS AND OBESITY

## What We Know and What It Means

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Critics of the Food Stamp Program point to higher rates of obesity among some low-income populations and question whether the program might have been too successful in boosting food consumption. They assert that giving assistance in the form of benefits

redeemable for food, instead of cash, has led participants to spend more on food and eat more than they would have otherwise. Others wonder if the monthly issuance of food stamp benefits is linked to boom-and-bust cycles of consumption that could lead to weight gain over the long term.

A recent ERS report explores whether there is any evidence of a causal link between food stamp participation and obesity. ERS reviewed and synthesized the growing and sometimes conflicting research on the issue. Researchers placed greater weight on studies that used statistical methods to control for the fact that people choose to participate in the program and those who

- Food Stamp Program participation does not increase the likelihood of being overweight or obese for men or children.
- Women are the only group for which multiple studies show a potential link between food stamp participation and body weight.
- Devising policy changes for household members who may be at risk of gaining weight, without harming those who are not but still need food assistance, is a difficult challenge.

do not increase either Body Mass Index (BMI—a measure of weight adjusted for height) or the likelihood of being obese. A review of the research indicates that food stamp benefits do not increase the likelihood of being overweight or obese for men or children. For nonelderly adult women, who account for 28 percent of all food stamp participants, multiple studies show a potential link between food stamp receipt and an increase in obesity and BMI, although this effect appears to be small—about 3 pounds for a woman 5'4" to 5'6" tall. Some studies found that long-term participation in the program appears to heighten the impact on obesity.

participate are likely to be different from those who do not in ways that researchers cannot always observe. These differences could be related to body weight.

The weight of evidence from these studies indicates that for most program participants, food stamp benefits





Jupiterimages (scale); USDA (EBT cards)

It is not clear why participation in the Food Stamp Program may increase the probability of obesity for women but not for men or children. Research about the causes underlying these results is not conclusive. Differences in energy requirements, activity levels, and eating patterns could be possible explanations. Because the Food Stamp Program is administered as a household-level program, devising program changes that are appropriately targeted to household members who may be at risk of gaining weight, without harming those who are not and need the nutritional assistance, is a challenge. Policy changes that help program participants improve their overall diets or help them “smooth” their food consumption over periods of high and low income may be more effective. For example, issuing food stamp benefits on a biweekly, or even weekly basis, may help food stamp participants obtain and consume food on a more even basis.

### Too Much Money for Food or Too Infrequently Issued?

The Food Stamp Program is an entitlement program available to all U.S. households that meet the eligibility requirements pertaining to income, assets, work, and immigration status. Program benefits can be used to purchase almost any food sold by participating food retailers, except for food prepared in the store, hot foods, and alcohol and tobacco. The average monthly benefit level in 2007 was \$96 per person and \$215 per household, which translates roughly to \$3.20 per person per day or \$7.16 per household per day to spend on food. Most program participants spend some of their own money on food in addition to their monthly food stamp allotment.

There are two leading explanations for how food stamp benefits could contribute to weight gain that may lead to obesity. The first argues that restricting



Jack Hollingsworth, Brand X Pictures

Food stamps may allow participants to increase their purchases of fruit and vegetables.

food stamp benefits to food purchases results in participants spending more money on food and, thus, consuming more food than they otherwise would if they did not participate in the program. Although food stamp benefits may have the intended effect of reducing undernourishment or underweight for at least some participants, this explanation implies that the benefits may also be pushing a portion of participants into overweight or obesity. If true, then one solution is to deliver food stamp benefits as cash. Cash benefits have been found to induce smaller increases in food spending than benefits that can be spent only on food.

But even if receiving food stamp benefits leads participants to spend more on food, it does not mean that the additional spending results in overconsumption and obesity. It is possible that food stamp benefits allow people to choose a different bundle of foods than they otherwise would. For example, participants may shift spending toward relatively more expensive foods that were previously out

of reach (e.g., fresh meats versus canned beans or fresh fruit and vegetables instead of canned items). Or, since food stamps can be redeemed for food only in grocery stores, participation in the program may shift a household's food spending toward foods prepared and consumed at home, as opposed to food away from home. In either case, an increase in food expenditures would not necessarily lead to overconsumption of calories or a poorer diet.

The food stamp cycle explanation argues that the practice of distributing food stamps only once a month results in alternate periods of under- and overconsumption, a pattern dubbed the “food stamp cycle,” which may result in weight gain. Households consume food every day but purchase food less regularly—every few days for some households, every few weeks for others. It is possible that food stamp participants run out of food (and benefits with which to purchase more food) near the end of the month. As food becomes scarce and food intake is



restricted, a person may lose weight. Then, when food is abundant, the individual may overeat. This distorted pattern of consumption with its periods of binge eating gradually can lead to increased weight.

### Teasing Out Cause and Effect

Two conditions can be associated with each other, without one being the cause and the other the effect. Food stamp benefits may be associated with increases in body weight but may not *cause* greater body weight if something else is to blame. Determining cause and effect is difficult because no experiments have been conducted comparing the body weights of participants randomly assigned to receive program benefits with those of others assigned to a comparison program (or lack of a program). Researchers must instead rely on nonexperimental methods that try to determine what would have happened if no one received food stamp benefits or if an alternative program to food stamps was implemented.

Comparing body weights of food stamp participants with those of eligible nonparticipants is an obvious starting point, but this approach may be problematic. Food Stamp Program participants may have different characteristics than those who are eligible for the program but choose not to participate. Very poor individuals, for example, may be more likely to participate than individuals who are less poor but still eligible. A household with a strong preference for food relative to other necessities may be more likely to apply for food stamps than an otherwise similar household. This strong preference for food may also lead to weight gain that would have occurred whether or not the household participated in the program.

While most studies try to control for as many differences between participants and nonparticipants as possible, it is likely that important differences are not observed. If these differences are related

to body weight, then the estimated effects of food stamp participation could be biased. This bias is called selection bias because individuals self-select into the Food Stamp Program. Researchers note that poverty is associated with higher risk of obesity in some population subgroups (for example, White women), but lower risk in others (among Black and Hispanic men), suggesting that selection bias can be positive or negative in the case of food stamp participation and obesity. Accounting properly for selection bias can reveal a higher or lower risk of obesity than estimates that do not account for such bias.

ERS researchers reviewed over a dozen studies of the relationship between food stamp participation and BMI and the likelihood of obesity. Several of the earlier studies used cross-sectional data (observations of many individuals for a single point in time) and controlled for observed factors that might be related to body weight, such as age, race, sex, and education. While these studies are useful for understanding broad trends and highlighting

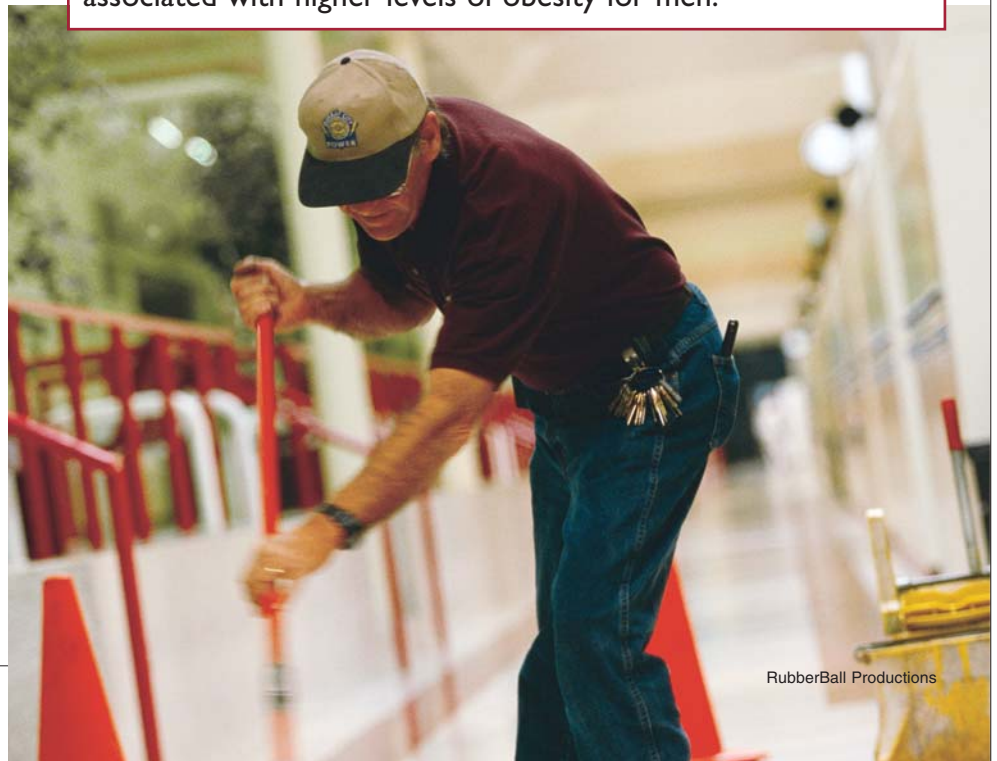
possible relationships for further exploration, they do not account for potential selection bias and only observe individuals at a point in time, so they are of limited use in drawing causal conclusions.

The ERS review focused primarily on studies that attempt to control for selection bias (often using longitudinal data with multiple observations on the same individuals) and which are better able to tease out cause and effect between food stamp participation and weight. One can never be sure that these methods are truly picking up cause and effect, but the methods used in these studies help researchers get closer to that goal.

### Diverse Effects Reflect Diverse Participants

The Food Stamp Program serves a diverse population. In 2006, children accounted for almost half of all participants. Working-age women made up 28 percent of the caseloads, working-age men 13 percent, and the elderly age 60 and older 8 percent. Most of the food stamps issued go to households containing a

Reviewed evidence suggests that food stamp participation is not associated with higher levels of obesity for men.



child, elderly adult, or nonelderly disabled person (89 percent of all benefits). Many of the households receiving food stamps are single-adult households with children (34 percent). The ERS review of the effects of food stamp participation on body weight for this diverse group of participants found that food stamp participation has a small effect on obesity for adult women, but not for men or school-age children. Only a few studies have looked at children younger than 5 and the elderly, and they did not control for selection bias, so these subgroups are not discussed here.

Results for children ages 5-12 vary across sexes and differ in the direction of the relationship between food stamp participation and body weight. For young boys, studies found either no relationship between food stamp participation and BMI, or that food stamp participation is linked to a lower probability of being overweight (BMI-for-age greater than or equal to the 95<sup>th</sup> percentile).

For young girls, some studies found no association between food stamp participation and BMI. One study found that additional years of food stamp participa-

tion were associated with greater probability of being overweight. Another found a negative relationship between food stamp participation and being at-risk of overweight (BMI-for-age greater than or equal to the 85<sup>th</sup> percentile). These two studies used different methodologies, which could account for the disparate results.

For adolescent children (ages 12-18), food stamp participation does not seem to be related to BMI or the probability of being overweight. None of the reviewed studies found a link between program participation and body weight for teenage boys or girls.

Only one reviewed study found a significant link between food stamp participation and BMI, overweight, or obesity status for men ages 19-59. That study found that food stamp participation by men was positively related to BMI but not to overweight or obesity. Previous studies comparing average BMI for men across food stamp participation and income levels found that for some racial and ethnic groups, food stamp participants had lower BMI than income-eligible nonparticipants

and higher income men. In view of that, it is possible that either the positive effect of food stamps on BMI was not large enough to shift more men into the overweight (BMI greater than 25) and obese (BMI greater than 30) categories, or the shift in BMI was an improvement among underweight men.

Adult (ages 19-59) women are the only food stamp participants for which multiple studies show a link between food stamp participation and overweight. Not all studies showed that participation affects body weight. However, results from studies that used different techniques to control for selection bias indicate that food stamp participation may increase the probability that a woman is obese. The estimated 2- to 5-percentage-point change in the probability of being obese translates into a 5- to 21-percent increase in obesity rates. Other results show that food stamp participation is associated with an estimated 0.5-point increase in BMI for women, or about 3 pounds for a woman between 5'4" and 5'6" tall.

### Over Longer Participation, Effects May Accumulate

The reviewed studies showed a stronger connection between long-term food stamp participation on body weight than short- or medium-term participation. Two studies found that women who received food stamp benefits for longer periods of time (one study defined "long term" as at least 2 consecutive years, the other as up to 5 consecutive years) increased the probability of being obese by 4.5 to 10 percentage points, which translates into a 20- to 50-percent increase in obesity rates.

Evidence is mixed with respect to long-term food stamp participation and men's weight. One study found no relationship between long-term participation (up to 5 consecutive years) on BMI or the



Almost half of all food stamp participants are children.



probability of obesity for men. A second study found that participation for at least 2 consecutive years increased BMI and the probability of obesity for men, but shorter and repeated participation did not have these effects.

Most food stamp participants receive benefits for less than a year—the median length of food stamp participation is 6 to 8 months. Some participants, however, cycle on and off food stamps and others participate for longer periods. It is possible that small but positive effects of current food stamp participation on BMI may accumulate over longer, or shorter but repeated, periods and result in substantial total effects on BMI over time. Or, if the causal mechanisms underlying weight gain for women are related to periods of boom and bust surrounding the monthly issuance of food stamp benefits, then prolonged food stamp use could result in long-term weight gain. Further research may be able to tell a clearer story.

### Implications for the Type and Timing of Benefits

One hypothesis of how food stamp participation causes weight gain is that benefit amounts are too high, causing participants to spend more money on food and, thus, consume more food than they otherwise would. One of the reviewed studies showed that the effect of food stamp participation on obesity is larger for single women than for women residing in households with more than one adult. Other research found that food stamps have little impact on the amount of money single women spend on food (i.e., the benefit amount is at least as big as what they otherwise would have spent on food). In that case, "cashing out" food stamp benefits to reduce overconsumption may not have the intended effect on body weight. The group whose weight is most affected by food stamp participation



Jupiterimages

would not change their food spending if the benefits were shifted to cash.

Some studies measured participation as a dichotomous yes-or-no condition, while others looked at the amount of benefits the household received. Studies that used the amount of benefits to measure participation found a less consistent relationship between food stamp benefit levels and obesity as those that used the dichotomous measure. So, while some studies suggest a relationship between food stamp participation and obesity among women in particular, the research does not clearly indicate that higher benefit levels are associated with greater BMI and obesity, or that lower benefits would lead to lower BMI.

None of the studies reviewed explicitly tested whether boom-and-bust food consumption patterns associated with the benefit payment cycle contribute to obesity. If further studies find a causal link between the timing of benefits and disrupted patterns of consumption, possible policy solutions could include either increasing the frequency of benefit payments (biweekly or weekly) or raising the benefit amount, which could, paradoxi-

cally, help reduce obesity by reducing hungry days at the end of the benefit cycle.

The stronger relationship between food stamp participation and body weight found for women but not for men, the mixed relationships found for young boys and young girls, and the lack of any relationships found for adolescents make it difficult to come up with appropriate changes to the program to address obesity. Most food stamp benefits go to households that contain a child, elderly adult, or nonelderly disabled adult. Devising program changes that are appropriately targeted to household members who may be at risk of gaining weight, without harming those who are not, will be difficult. Nutrition education efforts and other programs that help improve the overall diets of all household members may be more effective.  $\mathbb{W}$

#### This article is drawn from . . .

*Food Stamps and Obesity: What Do We Know?* by Michele Ver Ploeg and Katherine Ralston, EIB-34, USDA, Economic Research Service, March 2008, available at: [www.ers.usda.gov/publications/eib34/](http://www.ers.usda.gov/publications/eib34/)

#### You may also be interested in . . .

"Food Stamps and Obesity: Ironic Twist or Complex Puzzle?" by Michele Ver Ploeg, Lisa Mancino, and Biing-Hwan Lin, in *Amber Waves*, Vol. 4, No. 1, USDA, Economic Research Service, February 2006, available at: [www.ers.usda.gov/amberwaves/february06/features/feature4.htm](http://www.ers.usda.gov/amberwaves/february06/features/feature4.htm)

The ERS Briefing Room on the Food Stamp Program, [www.ers.usda.gov/briefing/foodstamps/](http://www.ers.usda.gov/briefing/foodstamps/)

The ERS Briefing Room on Diet and Health, [www.ers.usda.gov/briefing/dietandhealth/](http://www.ers.usda.gov/briefing/dietandhealth/)

# World Trade Organization and Globalization Help Facilitate Growth in Agricultural Trade

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- Despite the WTO having strong critics in the U.S. and abroad, membership in the organization continues to grow.
- WTO member countries trade concessions to gain access to foreign markets, benefiting producers and consumers in the aggregate.
- The growth of the WTO has helped facilitate the globalization of agriculture.

In simple terms, globalization refers to the closer integration of countries and people around the world. It is the product of numerous factors, including reduced trade barriers, lower transportation and communication costs, and increased movements of capital, knowledge, technology, culture, and people across borders. To many, these changes imply progress, but globalization is an issue of multiple dimensions that has sparked heated debates and protests around the world.

Proponents argue that globalization results in increased consumer choices and access, enables countries to use resources more

efficiently, leads to the introduction of new technologies, creates new industries, and promotes more rapid economic growth.

Critics maintain that globalization has exposed vulnerable economies to economic and financial shocks not of their making, contributed to environmental degradation, led to unemployment and downward pressure on wages, and strained the ability of poor countries to adapt.

In recent years, the World Trade Organization (WTO) has become a focal point of the globalization controversy, largely due to its visible role in reducing barriers to trade in goods and services. The massive protests at the 2001 WTO meeting in Seattle took many by surprise and thrust both globalization and the WTO into the world spotlight.

Critics of the WTO are not limited to anti-globalization protesters; proponents of free trade and globalization have also criticized the WTO. Some see the 7-year long negotiation of a new multilateral trade agreement as evidence that too many





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countries are unwilling to reach the compromises needed. Others cite the differences in expectations for developed and developing countries as a sign that the WTO is not even-handed. Still others see unacceptable threats to vulnerable industries and even to national sovereignty resulting from the disciplines required for membership.

Yet, since 1948, when the WTO's predecessor, the General Agreement on Tariffs and Trade (GATT), was launched, membership has grown from 23 to 151 countries. Another 30 countries hold observer status while they wait to become members. Given the criticism of the organization, why have so many countries joined?

### **Countries Seek Gains From Reciprocal Concessions**

Countries join the WTO for many reasons, but largely to increase trade, and, in particular, exports. One of the key contributions of economics has been its demonstration that countries can

mutually benefit from trade. In its simplest form, if country A produces wheat and country B produces coffee, both can improve citizens' welfare by exchanging wheat for coffee. Through the price system, which establishes values for the exchange of multiple commodities, the process can be extended to accommodate an infinite variety of goods.

This simple yet powerful concept is behind much of the trend toward globalization and has motivated countries to negotiate trade agreements. Trade negotiations basically involve reciprocal concessions—exchanges of tariff cuts or other grants of comparable value that enable this mutually beneficial exchange of goods. A primary reason countries engage in trade negotiations is to increase access to foreign markets for their products. Granting access to foreign producers is seen as a necessary cost of gaining access to other markets. However, reducing trade barriers also can facilitate growth and benefit the overall economy by enabling a country to use its resources more efficiently.



The benefits of reciprocal trade concessions extend beyond the increased exports valued by producers: consumers also gain from concessions that lower the cost of imports. Trade policies, like tariffs, that raise the cost of imports essentially act as taxes on consumption. Lower tariffs and quotas, for example, have reduced the cost of many clothing items for U.S. consumers. Lower tariffs have also helped make a wider variety of fresh produce available to U.S. consumers during winter months. When economists measure the benefits of trade agreements, they include both the value of increased exports and the increase in well-being of consumers that comes from paying lower prices.

Countries also seek membership in the WTO as a way to increase their potential for achieving economic growth and increased prosperity. For the generation of policy officials who witnessed the effects of protectionist policies on world economies during the Great Depression, the connection between trade and economic growth was clear. To remedy the policy mistakes of the 1930s and preceding decades, trade officials negotiated the 1947 GATT to lower barriers to interna-



Gerry Ellis, GettyImages

tional commerce and establish a charter setting out the broad principles that should govern trade policies.

Chief among these principles were the Most Favored Nation (MFN) and national treatment provisions. MFN mandated that importing countries would not be allowed to treat the same goods from the signatories of the GATT differently. National treatment mandated that imported goods should face the same regulatory standards as those imposed on the domestic goods of a member country. Both provisions convey powerful advantages to

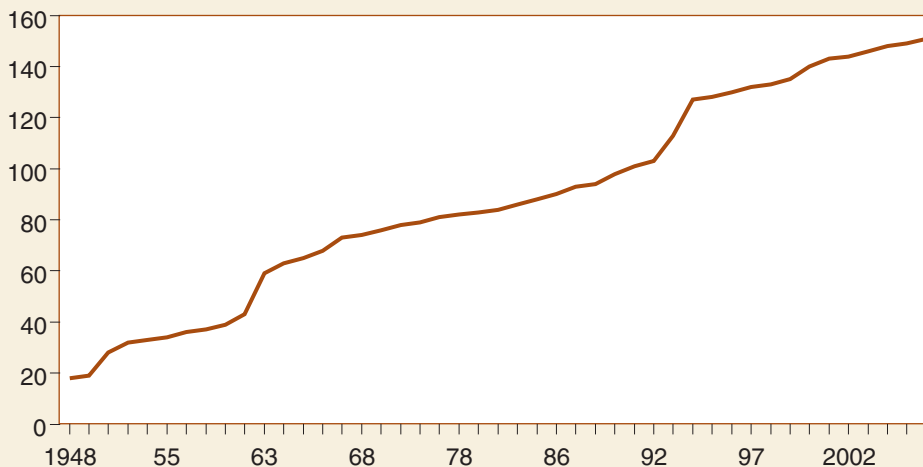
countries seeking access to foreign markets. Because of the MFN provision, a country joining the WTO today immediately qualifies for all the tariff concessions previously negotiated by members.

In the early years of GATT, membership meant participating in negotiations to reduce high tariffs that had restricted trade and led to economic hardship. Negotiations were conducted bilaterally and focused on the tariffs each country would like the other to reduce. Because the bilaterally negotiated concessions would be available to all GATT members through the MFN provision, other countries could balance those benefits against concessions they might be asked to make. For example, the U.S. could agree to cut a tariff on an import from another country even if it was not completely offset by an equivalent tariff cut by that country because the U.S. already expected to benefit from a tariff cut that country had negotiated with a third country.

As the membership in the GATT expanded, however, negotiators found it increasingly difficult and time consuming to complete bilateral deals. As a result, negotiations today follow a formula approach of across-the-board cuts. Deals among a large number of participants still offer countries the opportunity for balancing benefits against concessions.

**Despite controversy, WTO membership has grown steadily**

Number of countries



Source: World Trade Organization.



## WTO Provides the Framework for Rule Enforcement

In addition to providing a forum for trade negotiations, multilateral trade agreements like GATT and the WTO extend a consistent set of rules to many countries at once. Countries agree to rules of trade that may limit their own policy flexibility because the rules impose discipline on the trade policies of other members—all countries accept some pain to realize gains.

The expectation that the rules of trade apply to all members of the multilateral agreement underlies reciprocal concessions. Each member is protected from rules violations by others. If one country raises a tariff above its agreed (or bound) ceiling level, for example, the injured country may be due compensation. This may come in the form of tariff reductions on other products or other trade concessions equal to the level of damage from the violation. The enforceable threat of retaliation embedded in reciprocal agreements creates a powerful incentive for members to comply with their obligations.

The original GATT system lacked a strong means of enforcing rules violations.

Its dispute settlement process, which required consensus, allowed an importing country to unilaterally block trade complaints. Creation of the WTO provided the institutional framework to support a more effective dispute settlement process by providing measurable recourse to countries whose rights have been violated.

Adding to the original GATT rules, the WTO's Agreement on Agriculture and Agreement on the Application of Sanitary and Phytosanitary (SPS) Measures set out important provisions for governing trade in agricultural products. If issues related to a policy's compliance with trade rules cannot be resolved in bilateral discussions, countries can appeal to WTO committees that oversee the implementation of each individual agreement. For example, the Committee on Agriculture reviewed 155 notifications from members documenting their policies for market access, domestic support, and export subsidies in 2006. Likewise, the SPS Committee has provided a forum for airing grievances and made it easier to identify and track contentious regulations. The committee reports that one-third of the 245 "special trade concerns" identified by members over the past 12 years have

been fully or partially resolved through consultations. The committee also has facilitated dispute resolutions between countries at every level of development.

Additional WTO dispute settlement mechanisms for resolving conflicts include adjudication by a WTO panel and the WTO Appellate Body, if required. If a disputed measure is found to violate WTO provisions, the parties to the dispute may request arbitration to determine a "reasonable period of time" for the respondent to change its policy or, if it does not, to determine the amount of compensation or retaliation due to the complainant (usually in the form of tariff adjustments on other products).

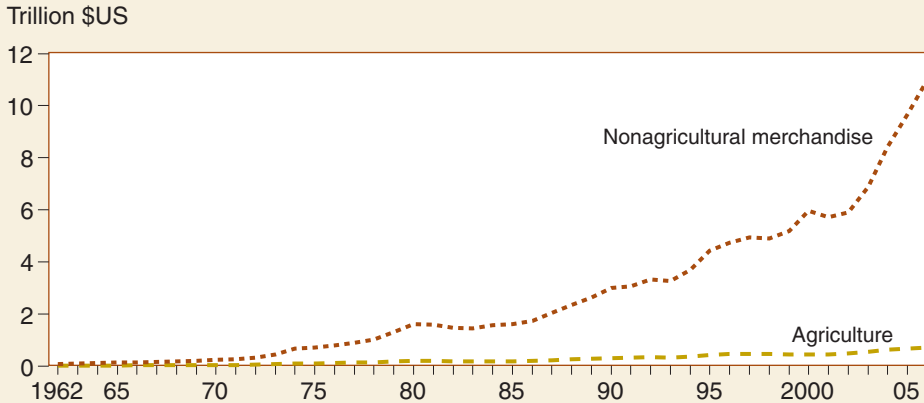
The WTO has also facilitated communication and transparency in the trading system and helped to resolve disputes before they reach formal settlement proceedings. A strengthened requirement for transparency is among the important institutional changes brought about in the transition from GATT to WTO. Country "notifications," or reports to the WTO of proposed changes in policies or regulations that could adversely affect trade, are key to enabling judgment about the purpose, design, or effect of a policy or measure. WTO notification is now routine for all member countries. For example, members submitted more than 8,000 notifications related to SPS measures between 1995 and 2007, compared with fewer than 80 between 1980 and 1990.

The evidence indicates that these notifications spawned a broad-based "regulatory review," as major agricultural importers and exporters began to assess whether they and their trading partners were complying with the SPS Agreement. As a result, several measures restricting trade in fruit and vegetables were unilaterally revised following technical consultations. For example, Japan agreed to rescind its 46-year-old ban on several

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**Growth in global nonagricultural trade has outpaced agricultural trade**



Source: UN Comtrade.

varieties of tomatoes grown in the United States based on scientific research indicating that the tomatoes were not afflicted with tobacco blue mold disease. New Zealand officially recognized that treating fruit with hot forced air was equivalent to spraying with a prohibited fumigant, thereby allowing several South Pacific countries to resume exports of mangos, papaya, and eggplant.

**WTO Helps Facilitate Globalization of Agriculture**

Under GATT, and more recently through the WTO, member countries have reduced tariffs on manufactured goods to exceptionally low levels, facilitating a steady increase in trade in manufactured goods since the 1950s. Global trade in agricultural products, however, has grown much less rapidly since then for a number of reasons, including the continued protection of agriculture by many countries. The body of rules established to govern merchandise trade made numerous exceptions for agricultural goods. One of the most important accomplishments of the Uruguay Round (1986-94) is that it succeeded in incorporating agriculture into the multilateral trade rules. Yet, agricultural trade continues to be influenced by a legacy of high protection and government

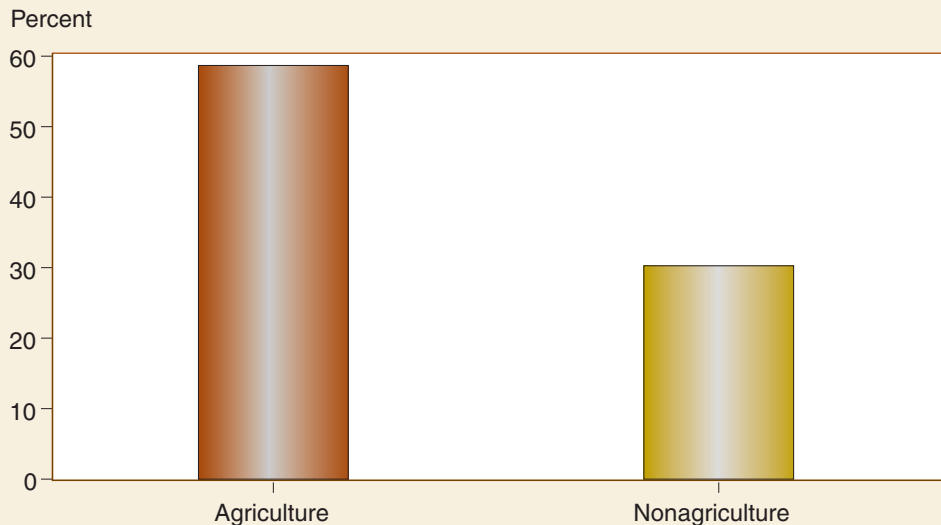
intervention (see box, "Why Agriculture Was Treated Differently Under GATT"). Tariffs on agricultural products remain significantly higher, on average, than tariffs on manufactured goods.

Despite higher protection on agricultural trade, a number of factors have led to its growth over the past 40 years. Improvements in transportation and handling, such as containerization and refrigeration, have facilitated shipments of out-of-season produce from distant ori-

gins, something not possible 20 years earlier. Communication and logistical improvements have enabled shippers of bulk agricultural commodities, like grains, to respond more easily to market demands for specific types, grades, and qualities. Greater purchasing power among developing countries, which tend to spend a higher share of increased income on food, has also contributed to growth in agricultural trade. These developments have been complemented in recent years by the reductions in barriers to agricultural trade brought about through the Uruguay Round Agreement on Agriculture as well as through bilateral and regional agreements.

Globalization of agriculture can bring positive benefits for developing countries. Reduced global tariffs on processed products may fuel economic development by encouraging developing country exports of these products, allowing them to benefit from the employment and value-added benefits associated with domestic processing. Greater trade opportunities also may expand markets for their goods, making investment more attractive. Reducing subsidies also can

**Global average bound agricultural tariffs were roughly double nonagricultural tariffs in 2004**



Source: World Trade Organization.



## Why Agriculture Was Treated Differently Under GATT

Prior to the Uruguay Round of trade negotiations, GATT agreements had largely avoided disciplining the agricultural sector. Agriculture had been viewed as being unique, facing price volatility due to weather, diseases, and pests peculiar to farming. At the same time, long-term growth in farm income had not kept pace with income growth in other sectors of the economy. These factors led some governments to implement policies aimed at increasing the stability and level of farm incomes through a combination of domestic supports and import restrictions. Other governments justified trade restrictions based on national security concerns, arguing that it was necessary for the government to ensure adequate supplies of food. By the time the Uruguay Round was launched in 1986, most countries had come to accept that, despite its special status, agricultural trade should be subject to the same rules as those governing nonagricultural trade and that support and protection for the agricultural sector should be progressively reduced.

Both in the lead-up to and during the Uruguay Round, numerous studies, including some conducted by ERS, demonstrated that the costs of countries' agricultural policies on consumers and taxpayers outweighed the benefits they conveyed to producers. The studies also quantified the extent to which the costs of these policies went beyond the imposing country to impact other countries by depressing international prices and diminishing competing exports. In the end, the Uruguay Round succeeded in incorporating agriculture into the multilateral trade rules and in taking the first steps toward decreasing government support and protection for the sector.

help developing countries by encouraging shifts of resources to more efficient uses, in agriculture or other sectors.

Successive rounds of multilateral trade liberalization, however, have revealed the difficulties that many low-income countries face in capturing the benefits of more open markets. In these countries, governments, institutions, and enterprises often lack capacities—in the form of information, policies, procedures, and infrastructure—to compete effectively in global markets and take full advantage of the opportunities that are offered through international trade. To help these countries overcome their trade-related institutional, human resource, and

supply capacity constraints, WTO members have agreed on steps to improve implementation of the current agreements. These initiatives include increased technical and financial assistance in trade policy and regulations, trade development, and economic infrastructure.

Furthermore, in order to ease the adjustment pressures brought on by trade liberalization, developing countries are granted special and differential treatment within the WTO. In particular, developing countries are asked to make smaller cuts in tariffs than those for developed countries and are given a longer period of time to phase in the cuts. In addition, all countries have access to safeguard measures

that allow them to temporarily restrain trade when their producers are threatened with serious injury as a result of imports.

Critics of the WTO have pointed to other limitations of the multilateral trading system, including the lack of agreements on environmental protection, labor standards, investment issues, and e-commerce. At the same time, the WTO has been attacked for tackling these other questions, which some consider peripheral to an agreement on trade. Attempts have been made to address some of these concerns in other forums, but these issues continue to be raised and are increasingly linked to globalization. The WTO may be further pressed to find a balance between what it views as its mandate to deal solely with trade rules and some of its members' views that through its trade rules, the WTO can make a contribution to addressing problems in other areas. *W*

### This article is drawn from ...

The ERS Briefing Room on the World Trade Organization,  
[www.ers.usda.gov/briefing/wto/](http://www.ers.usda.gov/briefing/wto/)

### You may also be interested in ...

"Global Agriculture and the Doha Round: Market Access Is the Key," by Anne Effland, Mary Anne Normile, and John Wainio, in *Amber Waves*, Vol. 4, Issue 4, USDA, Economic Research Service, September 2006, available at: [www.ers.usda.gov/amberwaves/september06/features/globalag.htm](http://www.ers.usda.gov/amberwaves/september06/features/globalag.htm)

*Agricultural Trade Preferences and the Developing Countries*, by John Wainio, Shahla Shapouri, Michael Trueblood, and Paul Gibson, ERR-6, USDA, Economic Research Service, May 2005, available at: [www.ers.usda.gov/publications/err6/](http://www.ers.usda.gov/publications/err6/)

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# Defining the “Rural” in Rural America

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Ken Hammond, USDA



- The share of the U.S. population considered rural ranges from 17 to 49 percent depending on the definition used.
- Rural definitions can be based on administrative, land-use, or economic concepts, exhibiting considerable variation in socioeconomic characteristics and well-being of the measured population.
- For research projects and economic development programs alike, the appropriate definition of rural will be that which meets the goals of the endeavor.

The term "rural" conjures widely shared images of farms, ranches, villages, small towns, and open spaces. Yet, when it comes to distinguishing rural from urban places, researchers and policymakers employ a dizzying array of definitions. The use of multiple definitions reflects the reality that rural and urban are multidimensional concepts, making clear-cut distinctions between the two difficult. Is population density the defining concern, or is it geographic isolation? Is it small population size that makes it necessary to distinguish rural from urban? If so, how small is rural? Because the U.S. is a nation in which so many people live in areas that are not clearly rural or urban, seemingly small changes in the way rural areas are defined can have large impacts on who and what are considered rural.

Researchers and policymakers share the task of choosing appropriately from among the more than two dozen rural definitions currently used by Federal agencies. For example, research on suburban development and its effect on rural real estate prices would probably define rural differently than a

study designed to track and explain economic and social changes affecting rural people and places. Programs developed to address the unique problems that small rural governments face will not necessarily target the same rural areas as will programs that are developed to help rural businesses operating in credit-constrained markets. The key is to use a rural-urban definition that best fits the needs of a specific activity, recognizing that any simple dichotomy hides a complex rural-urban continuum, with very gentle gradations from one level to the next.

Delineating a precise line between rural and urban America that best serves the purpose, given the complexity of today's settlement patterns, involves answering two questions:

1. Is a given urban entity defined in terms of its administrative boundaries, its land-use patterns, or its economic influence?
2. What is the minimum population size for an entity to be considered urban?

By identifying urban areas first, rural is defined as the territory that is not included. Good decisionmaking in choosing an appropriate rural definition requires an understanding of the key characteristics of urban entities and how they, in turn, determine the characteristics of rural definitions derived from them.

### Challenge Number One: Choosing an Appropriate Urban Boundary

There are three different concepts of “urban” that lead to very different boundary definitions, and thus to very different rural definitions:

- The *administrative* concept, used by many USDA rural development programs, defines urban along municipal or other jurisdictional boundaries.
- The *land-use* concept, used by the Census Bureau, identifies urban areas based on how densely settled the area is—the picture of settlement you get from an airplane.
- The *economic* concept, used in most rural research applications, recognizes the influence of cities on labor, trade, and media markets that extend well beyond densely settled cores to include broader “commuting areas.”

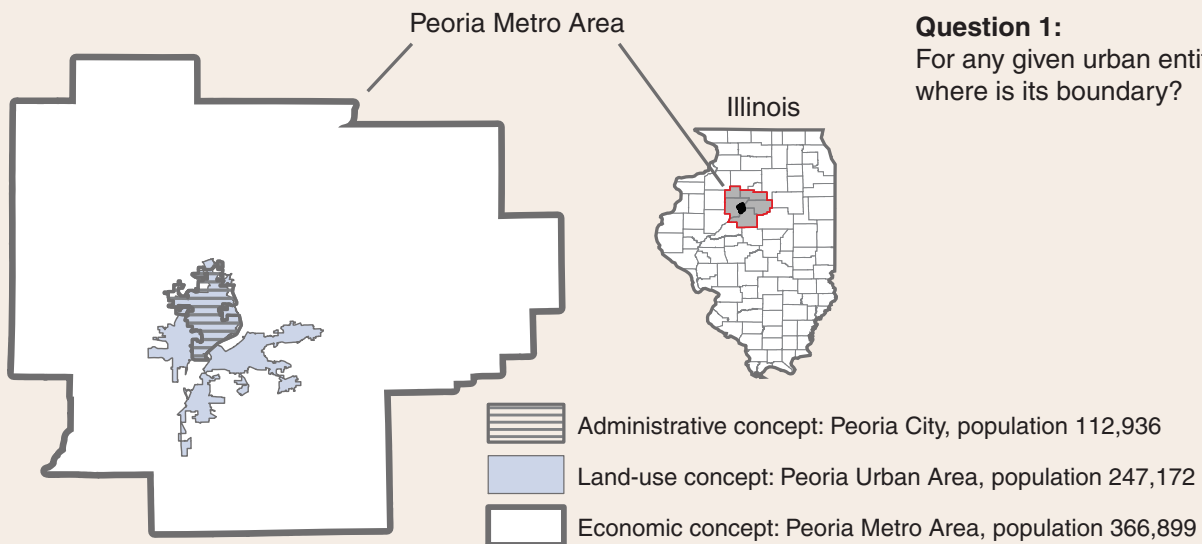


Tim McCabe, USDA

These three concepts represent progressively expansive urban boundaries that differ considerably from one another.

For instance, in 2000, Peoria, IL, as defined by its municipal boundaries, encompassed an area with about 113,000 people but as an economic entity it included nearly 367,000 people. Applying a land-use concept resulted in an area with a population between these two alternatives.

### Three ways to define Peoria



Source: USDA, Economic Research Service, using data from the U.S. Census Bureau.



For rural development programs that provide assistance to or through local governments, an administrative definition of rural is often a starting point for determining program eligibility. On the other hand, infrastructure programs meant to overcome the disadvantages sparsely populated areas face in providing water and sewer services may find rural definitions derived from the land-use concept helpful in targeting assistance. For programs requiring the coordination of efforts within broader market areas, such as area-wide transportation planning assistance, a definition based on economic concepts may be more appropriate. So ubiquitous are county-level data that researchers often divide urban and rural areas along county lines, making "non-metro" the de facto economic definition of rural for most research purposes (see box, "How Are the Boundaries Between Rural and Urban Developed?").

**Challenge Number Two: Choosing a Population Size Threshold**

In addition to being defined as the area outside urban boundaries—deter-

mined in different ways depending on the concept—rural includes some set of towns and villages below a chosen population threshold. For the 1910 Census, rural meant open countryside and any place with fewer than 2,500 people. Though the Census Bureau modified its definition over the decades to keep up with suburban expansion, it did not change the 2,500 population threshold as the minimum size for urban places. Over the same period, thresholds for some USDA rural development programs were adjusted upward, arguably an appropriate response to rapid urbanization. For example, the Rural Housing Program began in 1949, serving communities with fewer than 2,500 people, but it now sets eligibility at less than 20,000 people.

Proponents of a higher threshold point out that towns of 2,500 people typically have not maintained the levels and diversity of employment, goods, and services that existed in 1910. The tremendous transportation and communication advances of the past 100 years helped reorganize economic and social activities around larger towns and cities. The debate

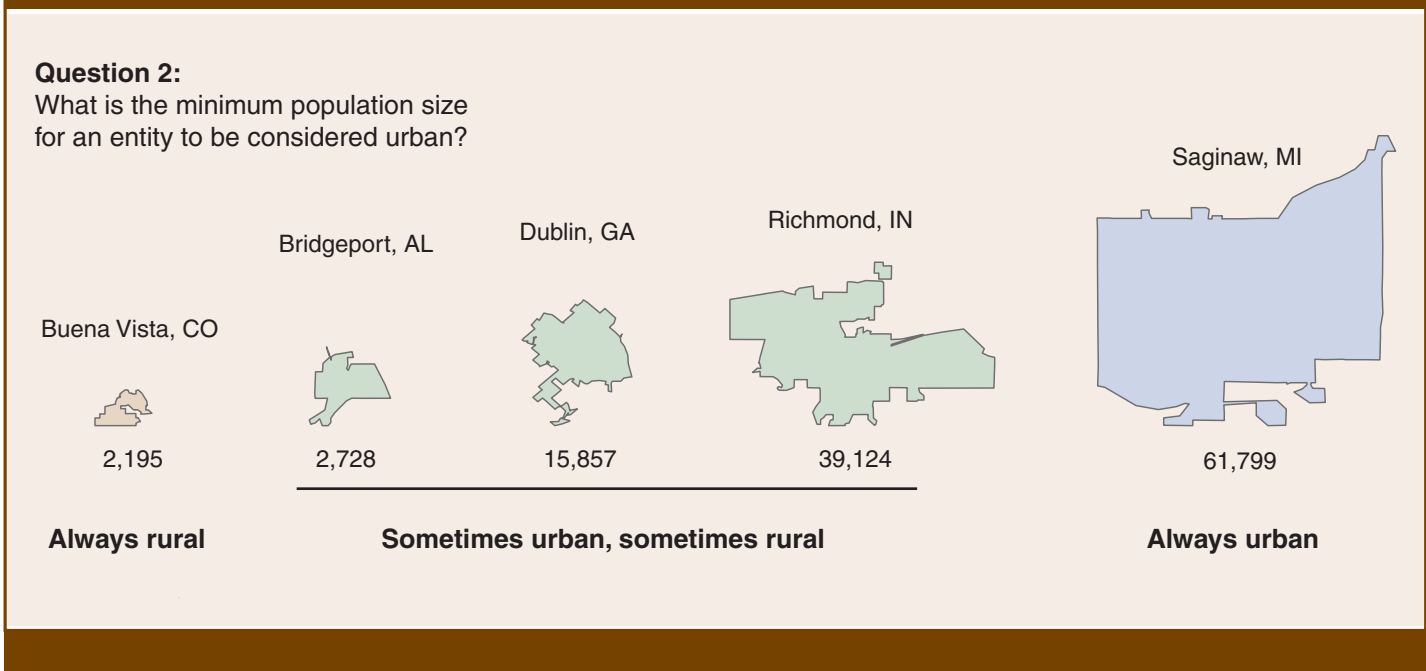
over an appropriate population size threshold between rural and urban places is ongoing. Definitions used by Federal agencies use population-size thresholds ranging from 2,500 to 50,000 people. For instance, the definition of rural used for USDA's Community Facilities programs consists of territory outside Census places of 20,000 or more. In contrast, the definition of nonmetro areas used by most researchers applies a 50,000 population threshold.

**Different Definitions Mean Big Differences in Rural Populations**

Depending on the boundary choice and the population threshold, the share of the U.S. population defined as rural and its socioeconomic characteristics vary substantially. In 2000, 21 percent of the U.S. population was designated rural using the Census Bureau's land-use definition (outside urban areas of 2,500 or more people), compared with 17 percent for economically based nonmetro areas (outside metro areas of 50,000 or more).

However, alternative definitions increase that range from 7 to 49 percent.

Depending on the definition, population size thresholds range from 2,500 to 50,000 people



**Rural population size and characteristics vary by definition**

		<i>Rural defined as territory outside</i>					
		<b>Census Bureau places (administrative)</b>		<b>Census Bureau urban areas (land-use)</b>		<b>OMB metro and micro areas (economic)</b>	
		<i>with populations less than:</i>					
	U.S. total	2,500	20,000	2,500	50,000	10,000	50,000
Population, 2000 (millions)	281.0	87.7	138.5	59.1	89.5	19.9	48.8
Percent of population defined as rural	na	31.1	49.2	21.0	31.8	7.1	17.4
Percent with a college degree	30.7	26.8	28.3	22.5	22.9	18.5	20.8
Average household income (\$1,000)	57.0	56.0	56.0	51.0	49.0	40.0	43.0

na = not applicable.

Source: USDA, Economic Research Service using data from the U.S. Census Bureau's 2000 decennial census.

**What Are the RUCA Codes?**

Counties are often too large, especially in Western States, to accurately represent labor market areas in all cases. Thus, metro and micro areas often include territory that is legitimately rural from both a land-use and economic perspective. ERS Rural-Urban Commuting Area (RUCA) codes provide an alternative, economic classification using census tracts rather than counties. Although relatively new, these codes have been widely adopted for both research and policy, especially in rural health applications.

RUCA codes follow (as closely as possible) the same concepts and criteria used to define metro and micro areas. By using the more detailed census tracts, they provide a different geographic pattern of settlement classification. While counties are generally too large to delineate labor market areas below the 10,000 population threshold, RUCA codes identify such areas for towns with populations as small as 2,500. Additional information and files containing the codes are available in the ERS Measuring Rurality Briefing Room: [www.ers.usda.gov/briefing/rurality/ruralurbancommutingareas/](http://www.ers.usda.gov/briefing/rurality/ruralurbancommutingareas/)

Raising the population size threshold for the land-use definition from 2,500 to 50,000 increases the rural population from 21 to 32 percent. Lowering the threshold for the economic definition from 50,000 to 10,000 decreases the rural population from 17 to 7 percent.

Holding the population threshold constant at the minimum level of 2,500 people

but moving from an administrative to a land-use definition drops the U.S. rural population by a third, from 31 to 21 percent. This change represents a shift in the designation of people who live in areas typically described as suburban, who are counted as rural under the narrower administrative concept but as urban under the land-use version. A similar shift in sub-

urban population occurs at the upper population threshold of 50,000, where rural population decreases from 32 percent based on the Census Bureau's land-use concept to 17 percent under the economic definition. (For descriptions of each definition, see box, "How Are the Boundaries Between Rural and Urban Developed?")

Alternating the definition of rural also varies the socioeconomic characteristics of designated areas. Rural populations consistently show lower education and income levels than the overall U.S. population, however they are defined. Given that rural definitions based on administrative boundaries include larger shares of what could be classed as suburban areas, the education and income levels of their populations are closer to those of the general U.S. population. The suburban population counted as rural is much smaller for the economic definition represented by non-metro areas. Thus, the share of the rural population with a college degree drops from 28 to 18 percent across this range and the average household income drops from \$56,000 to \$40,000.

**Multiple Measures of Rural Serve Multiple Purposes**

Rural definitions are not limited to the options discussed here. For instance, ERS provides an alternative to OMB's metro and micro definitions that uses census tracts instead of counties (see box: "What Are the RUCA Codes?"). In the 2002 farm bill, administrative and land-use concepts were essentially combined for a rural definition adopted by several USDA funding programs. Eligible territory includes areas outside Census places of 50,000 or more and their adjacent urban areas.

With so many options, which definition is best? The choice of a rural definition should be based on the purpose of the activity. For instance, analyzing the effect of population loss on per capita fiscal costs for rural communities is best approached using



## How Are the Boundaries Between Rural and Urban Developed?

Rural definitions based on the administrative concept start with the Census Bureau's list of "places." Most places listed in the 2000 Census are incorporated entities with legally prescribed boundaries (e.g., Peoria City), but some are locally recognized, unincorporated communities. Rural is defined as territory outside these place boundaries, together with places smaller than a selected population threshold. For example, USDA's Telecom Hardship Loan Program defines rural as any area outside Census places of 5,000 or more people.

Rural definitions based on the land-use concept most often start with the Census Bureau's set of urban areas, consisting of densely settled territory. Rural as defined by the Census Bureau includes open countryside and settlements with fewer than 2,500 residents. Urban areas are specifically designed to capture densely settled territory regardless of where municipal boundaries are drawn. They include adjacent suburbs that are outside place boundaries and exclude any territory within places that does not meet the density criteria.

The most widely used rural definition based on the economic concept consists of the 2,050 nonmetropolitan (nonmetro) counties lying outside metro boundaries. Metropolitan (metro) areas are county-based entities that account for the economic

influence of cities. The Office of Management and Budget (OMB) defines them as:

- Core counties with one or more urban areas of 50,000 people or more, and;
- Outlying counties economically tied to the core counties, as measured by the share of the employed population that commutes to and from core counties.

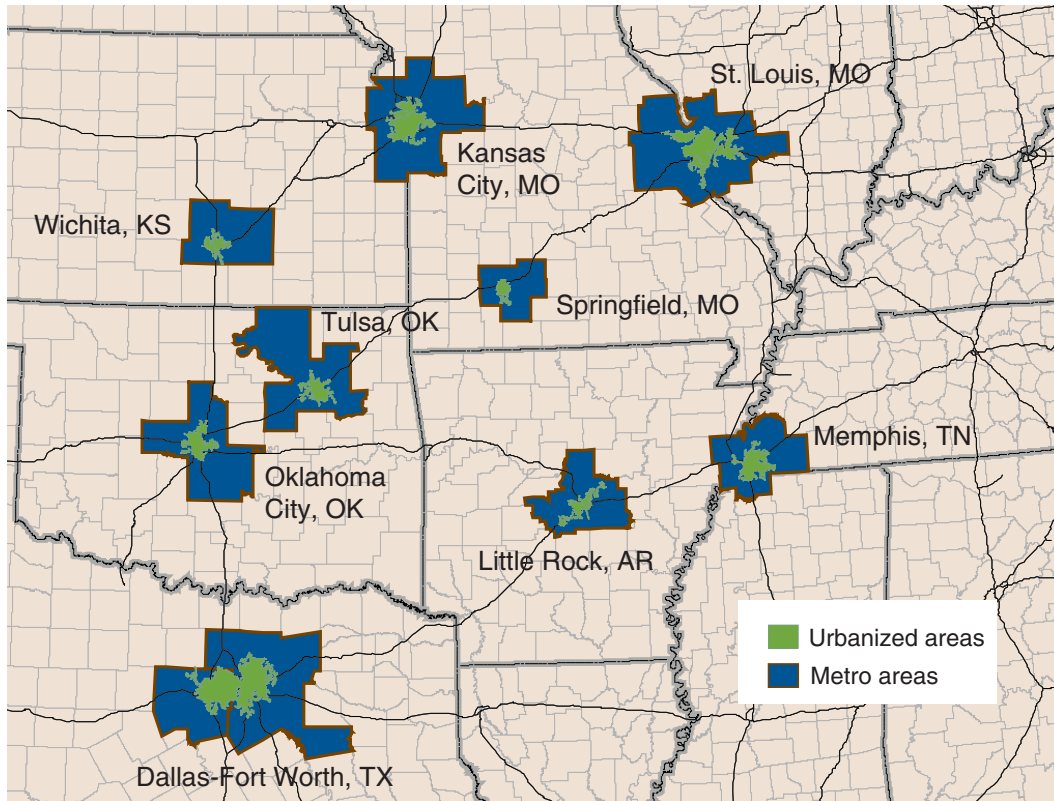
Using these criteria, urban entities are defined as countywide or multicounty labor market areas extending well beyond their built-up cores.

Prior to 2000, the land-use concept (Census urban areas) and the economic concept (OMB metro areas) were not applied to urban entities below 50,000 people. In 2000, the Census Bureau added urban areas ranging in size from 2,500 to 49,999 (labeling them urban clusters to distinguish them from the larger urbanized areas that had been defined since 1950). OMB added a new micropolitan (micro) area classification, using the same criteria as used for metro areas but lowering the threshold to 10,000 people. These modifications greatly increase the flexibility of researchers and administrators to tailor rural definitions to different target populations.



Ken Hammond, USDA

County-based metro areas extend far beyond their densely settled cores



Note: Map shows only selected metro areas.

Source: USDA, Economic Research Service, using data from the U.S. Census Bureau.

administrative boundaries because taxation and service provision often follow these lines. Tracking urbanization and its influence on farmland prices is best approached from a land-use definition that can distinguish built-up territory from surrounding, less developed land and the degree to which this boundary shifts over time. Mapping discontinuities in the supply and demand for medical services and analyzing their effect on rural well-being would likely focus on distance to labor markets as a key determinant of health care accessibility.

In any application involving measurement, data availability will play a major role. Studies of the effects of unemployment, poverty, retirement, industrial restructuring, and other trends on rural areas cannot easily employ administrative or land-use definitions because data are not available to support them. County-level, economic definitions (nonmetro

areas) dominate rural research for this reason. However, researchers need to carefully analyze and report the implications of any definitional choice: Who is included in the study and who is left out? What information is being masked by using large geographical building blocks, such as counties? How does this rural geography vary by State?

Policymakers face the same questions when crafting eligibility rules that best fit particular rural programs but are not as limited by data considerations. Considerable flexibility exists in tailoring definitions to suit a given application, and the appropriate choice may vary depending on program goals. A program providing housing assistance may be designed to target more isolated or economically distressed rural settings than would programs designed to stimulate business starts and job creation. Rural

communities lacking access to health services may not be the same areas missing broadband support. Careful consideration of alternative definitions of rural and their socioeconomic characteristics has the potential to improve the overall efficiency of economic development programs by enabling them to better target the intended beneficiaries.  $\mathcal{W}$

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ERS Rural Definitions Data Product, [www.ers.usda.gov/data/ruraldefinitions/](http://www.ers.usda.gov/data/ruraldefinitions/)

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# Rural America At A Glance ...

## Concise Summaries of Selected Issues

By USDA's Economic Research Service



### Rural America At A Glance

This annual report covers current social and economic indicators for rural America, reporting on trends in employment and earnings, population and migration, poverty and income, and Federal program funding. Key indicators are provided, for use by public and private decisionmakers and others, in efforts to enhance the economic opportunities and quality of life for rural people and their communities.  
September 2007

### Rural Poverty At A Glance

Information on poverty trends and demographic characteristics of the rural poor. While metro and nonmetro areas have shared similar patterns of reductions and increases in poverty rates over time, the nonmetro poverty rate consistently remains higher than the metro poverty rate. Large metro-nonmetro gaps also exist when poverty is analyzed by race, ethnicity, age, and family structure.  
July 2004

### Rural Children At A Glance

Demographic, social, and economic characteristics of rural children in families. Although rural child poverty rates declined in the 1990s, they remain higher than the rates for urban children (21 percent vs. 18 percent). In 2003, 2.7 million rural children were poor, representing 36 percent of the rural poor. Child poverty is heavily concentrated in the South.  
April 2005

### Rural Education At A Glance

Information from the 2000 Census and other Federal sources on the education characteristics of rural workers and counties. The report finds that racial educational differences remain large and that adult education levels remain far below the national average in many rural counties, particularly in the South. Counties with more educated populations appear to have performed better economically in the 1990s and have lower poverty rates.  
January 2004

### Rural Transportation At A Glance

The effects of deregulation, devolution of Federal transportation responsibilities to the States, increased Federal funding, and heightened security concerns are discussed in the context of each mode of transportation. While 93 percent of rural households have access to a vehicle, high proportions of carless rural households are clustered in the South, Appalachia, the Southwest, and Alaska.  
January 2005

### Rural Hispanics At A Glance

Hispanic population growth has helped to stem decades of population decline in many rural areas. The pamphlet draws on the latest information from the 2000 Census and other Federal data sources to highlight the growth of the Hispanic population in the U.S. and its geographic dispersion to the Midwest and Southeast. The pamphlet also summarizes demographic characteristics and the most recent indicators of social and economic conditions for Hispanics.  
December 2005

[www.ers.usda.gov/emphases/rural/ataglance.htm](http://www.ers.usda.gov/emphases/rural/ataglance.htm)

# How Much Time Do Americans Spend Eating?

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GettyImages

Successful policies to mitigate the rise in obesity and other diet-related health conditions in the U.S. depend on an understanding of Americans' eating patterns. Eating patterns encompass not only what and how much people eat, but also when and where they eat, how long they spend eating or snacking, and whether they dine alone or with others.

The Eating & Health Module of the American Time Use Survey (ATUS) collects information on Americans' eating patterns, general health, food and nutrition assistance program participation, grocery shopping, and meal preparation. Funded by ERS and the National Cancer Institute, the Module is a supplement to the U.S. Bureau of Labor Statistics' ATUS, a continuous survey that began in 2003. One individual from each sampled household is interviewed about his or her use of time for the 24-hour period on the day before the interview. Survey respondents are asked to identify their primary activity if they were engaged in more than one activity at a time.

According to 2006 ATUS and Module data, Americans age 15 and older spent 67 minutes on an average day in "primary" eating and

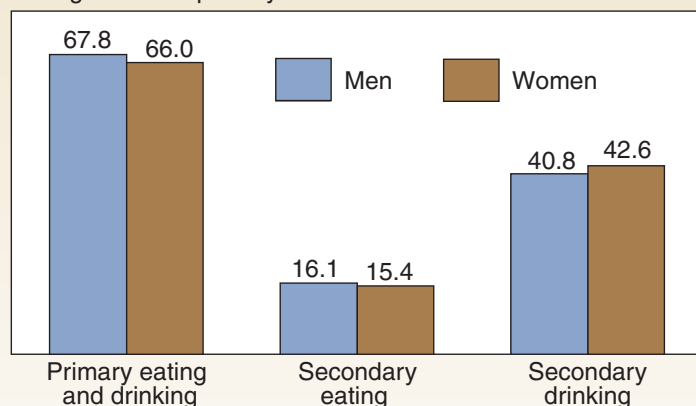
drinking of beverages, that is eating/drinking as a self-reported main activity. In addition, Americans spent an average of 16 minutes eating and 42 minutes drinking beverages (except for plain water) as secondary activities, such as while working, watching television, or playing sports. An additional 7 minutes were spent in associated activities (such as travel time to a restaurant and waiting to order). Men and women spent about the same amount of time eating/drinking.

Four percent of the U.S. population reported spending no time in primary eating/drinking on an average day, but they did spend an average of 35 minutes in secondary eating and 107 minutes (1.8 hours) in secondary drinking. Another 8 percent of the population, referred to as "constant grazers," spent an unusually long time eating and drinking—4.5 hours or more each day. Most of this group's food consumption time was spent in secondary drinking or sipping of beverages.

About two-thirds of Americans' primary eating/drinking occurrences were with family or others. However, only 42 percent were with others for secondary eating or secondary drinking, with the rest done either alone, at work, or while engaged in grooming or other personal care activities.

## In 2006, men and women spent about the same amount of time eating and drinking

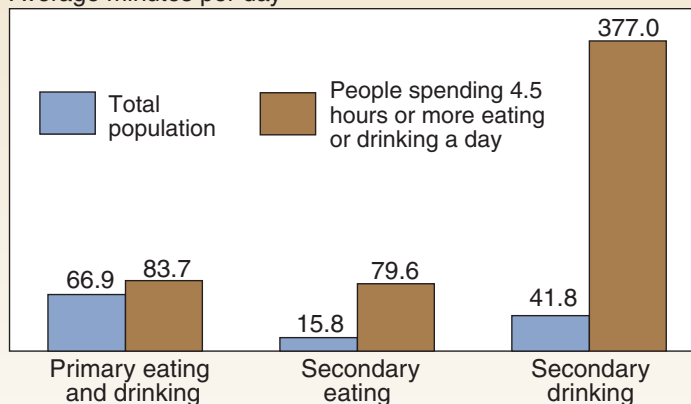
Average minutes per day



Note: Data include civilian population age 15 and over.  
 Source: Bureau of Labor Statistics 2006 American Time Use Survey and ERS 2006 Eating & Health Module.

## Constant grazers spent over 6 hours a day in secondary drinking

Average minutes per day



Note: Data include civilian population age 15 and over.  
 Source: Bureau of Labor Statistics 2006 American Time Use Survey and ERS 2006 Eating & Health Module.



**On an average day in 2006...**

**The top three places for primary eating and drinking were:**

- Own home or yard—67.2%
- Workplace—12.9%
- Restaurant or bar—11.2%

**The top three places for secondary eating or drinking were:**

- Own home or yard—53.4%
- Workplace—20.0%
- Driving, walking, or biking—8.9%

**The top five activities that accompanied secondary eating or drinking were:**

- Relaxing and leisure—29.2% (watching television and movies accounted for about two-thirds of this category)
- Paid working—19.5%
- Socializing and communicating—5.9%
- Preparing, presenting, and cleaning up food and drink—5.2%
- Housework—4.4%

**The top five activities that accompanied secondary eating or drinking, by average time spent engaged in eating and drinking, were:**

- Attending or hosting social events—77.2 minutes
- Paid working—70.3 minutes
- Arts and entertainment (includes movies, excludes sporting events)—68.5 minutes
- Participating in sports, exercise, or recreation—54.0 minutes
- Lawn, garden, and houseplant care—46.8 minutes

Source: ERS calculations using the Bureau of Labor Statistics American Time Use Survey and the ERS Eating & Health Module.

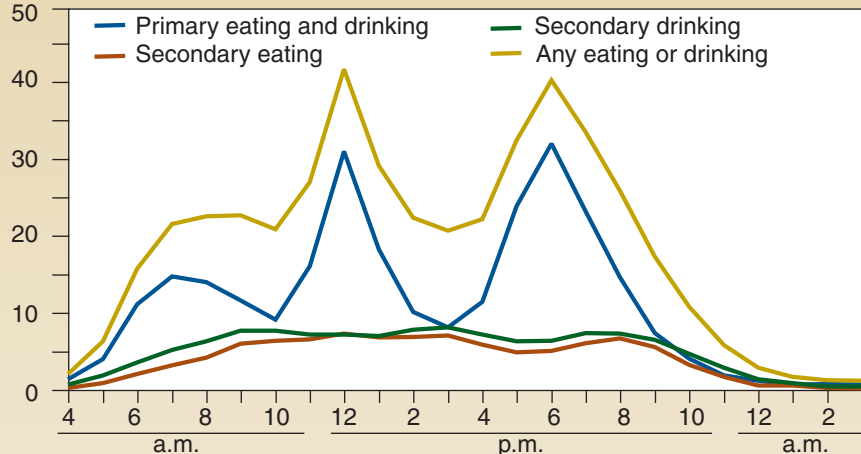
Over the course of the day, about 22 percent of the population was engaged in some eating or drinking activity between 7 a.m. and 10 a.m. Between noon and 1 p.m., 42 percent of Americans were engaged in eating and/or drinking activity. The evening peak was between 6 p.m. and 7 p.m., with 40 percent engaged in eating or drinking.

Average time spent in primary and secondary eating/drinking did not vary much by Body Mass Index (BMI), contrary to expectations. Those considered underweight spent more time in secondary drinking than the other BMI groups. More research is needed to understand the complexities of food consumption time patterns and BMI, such as looking at whether an individual's eating is a primary or secondary activity, and analyzing eating time patterns over the day.

The Eating & Health Module was added to the ATUS in January 2006 and is scheduled to be included through 2008. Analyses of the additional survey information collected will allow researchers to study the relationship between obesity and allotment of time (eating, exercise, inactivity); differences in time-use patterns between households that receive food stamp benefits and other low-income households; and the relationship between parents' time-use patterns and their children's consumption of meals purchased at school or day care.

**Lunch and dinner hours are peak eating and drinking times**

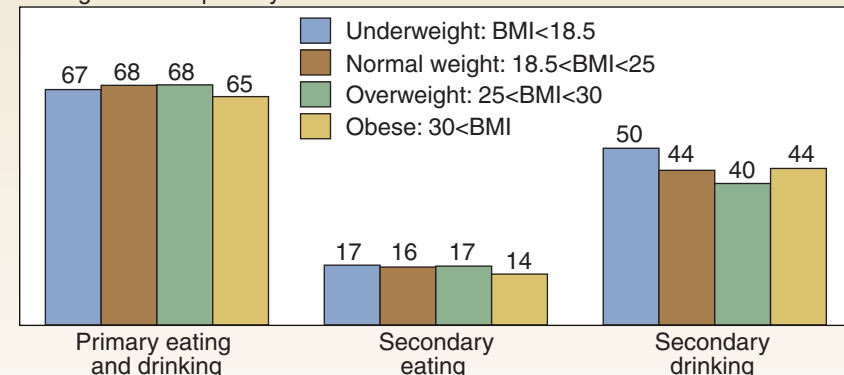
Percent of Americans engaged in activity



Note: Data include civilian population age 15 and over. Source: Bureau of Labor Statistics 2006 American Time Use Survey and ERS 2006 Eating & Health Module.

**Americans of different weight categories spend about the same time engaged in eating**

Average minutes per day



Note: Data include civilian population age 15 and over. Source: Bureau of Labor Statistics 2006 American Time Use Survey and ERS 2006 Eating & Health Module.

**This article is drawn from ...**

The Eating & Health Module, [www.ers.usda.gov/data/atus/](http://www.ers.usda.gov/data/atus/)

**For more information ...**

The American Time Use Survey, [www.bls.gov/tus/home.htm](http://www.bls.gov/tus/home.htm)

Data may have been updated since publication. For the most current information, see [www.ers.usda.gov/publications/agoutlook/aotables/](http://www.ers.usda.gov/publications/agoutlook/aotables/).

## Farm, Rural, and Natural Resource Indicators

	2004	2005	2006	2007	2008	Annual percent change			
						2004-05	2005-06	2006-07	2007-08
Cash receipts (\$ bil.)	237.3	240.7	239.3	285.4 p	313.2 f	1.4	-0.6	19.3	9.7
Crops	113.7	115.9	120.0	143.9 p	174.6 f	1.9	3.5	19.9	21.3
Livestock	123.6	124.9	119.3	141.4 p	138.7 f	1.1	-4.5	18.5	-1.9
Direct government payments (\$ bil.)	13.0	24.4	15.8	12.0 p	13.4 f	87.7	-35.2	-24.1	11.7
Gross cash income (\$ bil.)	267.4	281.3	272.5	316.2 p	346.0 f	5.2	-3.1	16.0	9.4
Net cash income (\$ bil.)	82.2	85.8	67.9	87.6 p	96.6 f	4.4	-20.9	29.0	10.3
Net value added (\$ bil.)	127.8	121.4	104.4	137.6 p	144.1 f	-5.0	-14.0	31.8	4.7
Farm equity (\$ bil.)	1,401.9	1,576.1	1,771.8	2,002.7 p	2,286.2 f	12.4	12.4	13.0	14.2
Farm debt-asset ratio	11.5	10.9	10.5	9.9 p	9.1 f	-5.2	-3.7	-5.7	-8.1
Farm household income (\$/farm household)	81,596	81,599	77,654	84,159 p	89,434 f	0.0	-4.8	8.4	6.3
Farm household income relative to average U.S. household income (%)	134.8	128.8	116.7	na	na	-4.5	-9.4	na	na
Nonmetro-metro difference in poverty rate (% points) <sup>1</sup>	na	2.3	3.4	na	na	na	na	na	na
Cropland harvested (million acres)	312	314	304 p	na	na	0.6	-3.2	na	na
USDA conservation program expenditures (\$ bil.) <sup>2</sup>	5.1	na	na	na	na	na	na	na	na

## Food and Fiber Sector Indicators

U.S. gross domestic product (\$ bil.)	11,713	12,456	13,247	na	na	6.3	6.4	na	na
Share of agriculture & related industries in GDP (%) <sup>1</sup>	4.8	4.5	4.3	na	na	-6.3	-4.4	na	na
Share of agriculture in GDP (%) <sup>1</sup>	1.0	0.8	0.7	na	na	-16.3	-12.5	na	na
Total agricultural imports (\$ bil.) <sup>2</sup>	52.7	57.7	64.0	70.0	76.5	9.5	10.9	9.4	9.3
Total agricultural exports (\$ bil.) <sup>2</sup>	62.4	62.5	68.7	81.9	101.0	0.2	9.9	19.2	23.3
Export share of the volume of U.S. agricultural production (%) <sup>1</sup>	21.3	21.7	22.3	23.0 f	na	1.9	2.8	3.1	na
CPI for food (1982-84=100)	186.2	190.7	195.3	202.9	212.1	2.4	2.4	3.9	4.5
Share of U.S. disposable income spent on food (%)	9.7	9.8	9.9	na	na	1.0	1.0	na	na
Share of total food expenditures for at-home consumption (%)	51.5	51.4	51.1	na	na	-0.2	-0.6	na	na
Farm-to-retail price spread (1982-84=100)	232.1	239.2	246.2	248.3	na	3.1	2.9	0.9	na
Total USDA food and nutrition assistance spending (\$ bil.) <sup>2</sup>	46.2	50.9	53.1	54.3	na	10.2	4.3	2.3	na

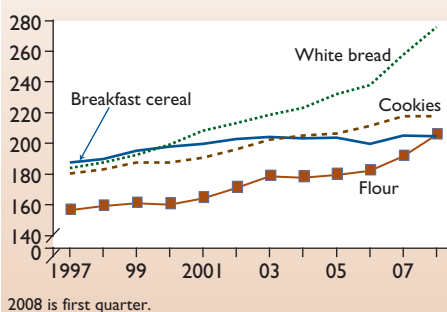
f = Forecast. p = Preliminary. na = Not available. All dollar amounts are in current dollars.

<sup>1</sup> The methodology for computing these measures has changed. These statistics are not comparable to previously published statistics. Sources and computation methodology are available at: [www.ers.usda.gov/amberwaves/indicatorsnotes.htm](http://www.ers.usda.gov/amberwaves/indicatorsnotes.htm)

<sup>2</sup> Based on October-September fiscal years ending with year indicated.

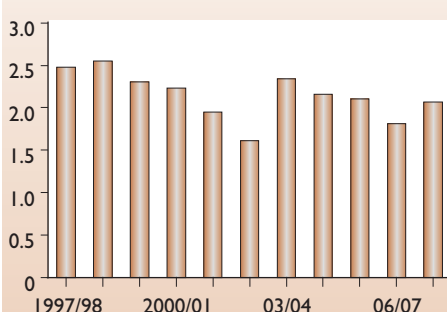
### Higher wheat costs boost prices for flour and bread

Consumer Price Index, 1982-84=100



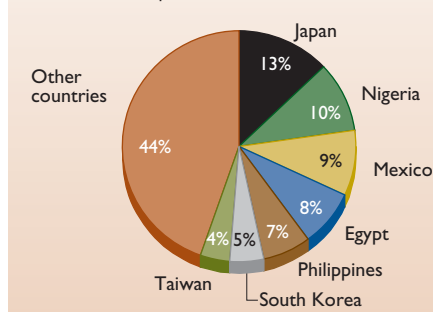
### 2007/08 U.S. wheat production just below 10-year average

Billion bushels



### Japan top destination for U.S. wheat exports, 2006/07

Total U.S. wheat exports = 24.8 million metric tons

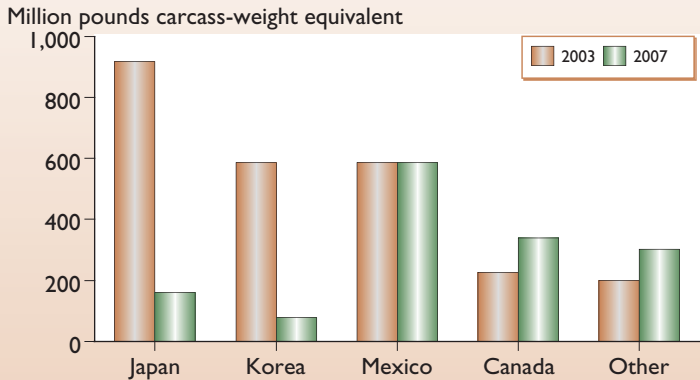


For more information, see [www.ers.usda.gov/amberwaves](http://www.ers.usda.gov/amberwaves)

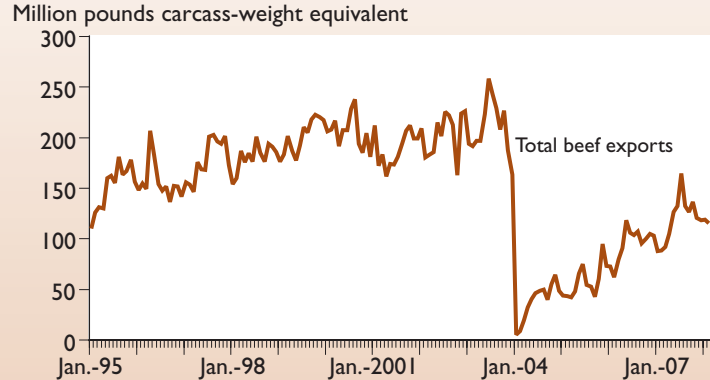


## Markets and Trade

**Customers for U.S. beef have shifted since the first confirmed BSE case in 2003...**



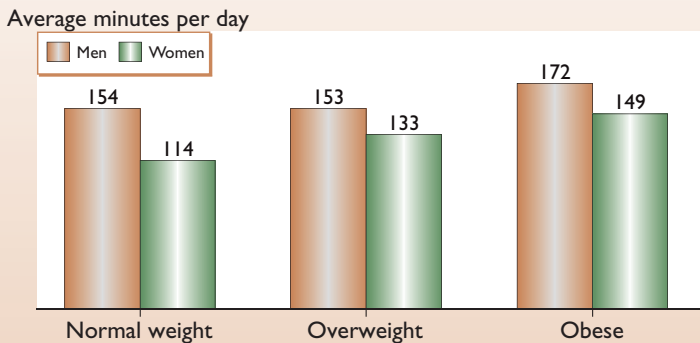
**...and beef exports remain below pre-2004 levels**



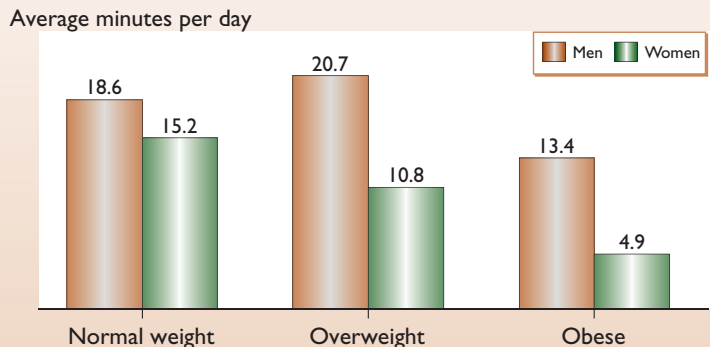
Source: Calculations by USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census data.

## Diet and Health

**In 2006, obese Americans spent more time watching television...**



**...and less time participating in sports and exercise than nonobese Americans**

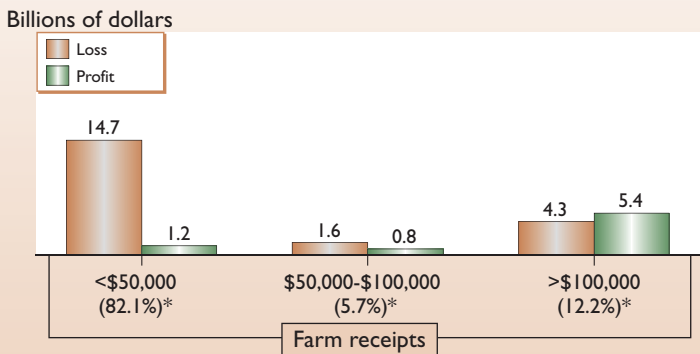


Note: Data include civilian population age 25-65. Normal weight: 18.5<BMI<25; overweight: 25<BMI<30; and obese: 30<BMI.

Source: Bureau of Labor Statistics, 2006 American Time Use Survey (ATUS); and ERS 2006, Eating & Health Module of the ATUS.

## Farms, Firms, and Households

**Farms with receipts over \$100,000 accounted for nearly three-quarters of all farm profits in 2004**

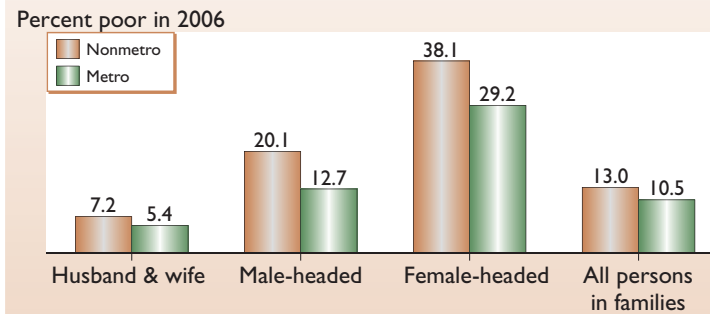


\* Share of all farm sole proprietors.

Source: Internal Revenue Service, Statistics of Income, 2004.

## Rural America

**More than one-third of persons in female-headed nonmetro families are poor**



Note: Poverty thresholds vary by size of family and number of related children under 18 years. For example, in 2006, the poverty threshold for a family of four with two children under 18 was \$20,444.

Source: USDA, Economic Research Service, using data from the U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement, 2007.

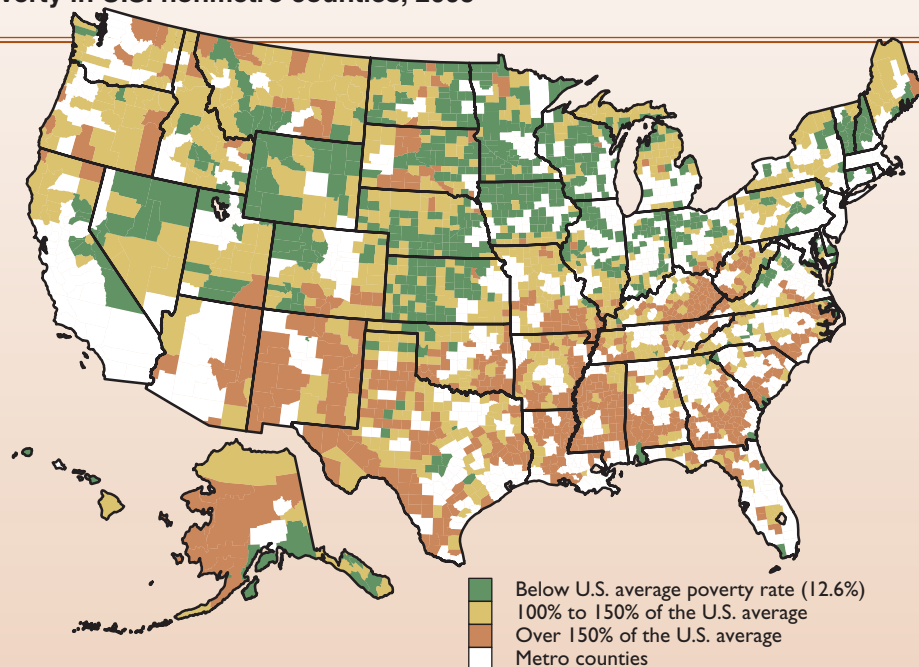
## On the Map

### Nonmetro poverty is more concentrated in the South and Southwest

Nonmetro counties with high poverty rates are clustered in Appalachia, the Mississippi Delta, the Southeastern Cotton Belt, the Southwest region along the Mexican border, and Indian reservations located in the northern and western regions. These high-poverty counties usually are sparsely settled and more remote from metropolitan areas and are more likely to have lower education levels and larger minority populations than counties with lower poverty levels. Poverty tends to be longstanding and stems from complex economic and social conditions. Many high-poverty counties are characterized by a preponderance of low-skill and low-wage jobs.

**Timothy Parker,**  
tparker@ers.usda.gov

### Poverty in U.S. nonmetro counties, 2005



Source: U.S. Census Bureau, 2005 Small Area Income and Poverty Estimates (SAIPE).

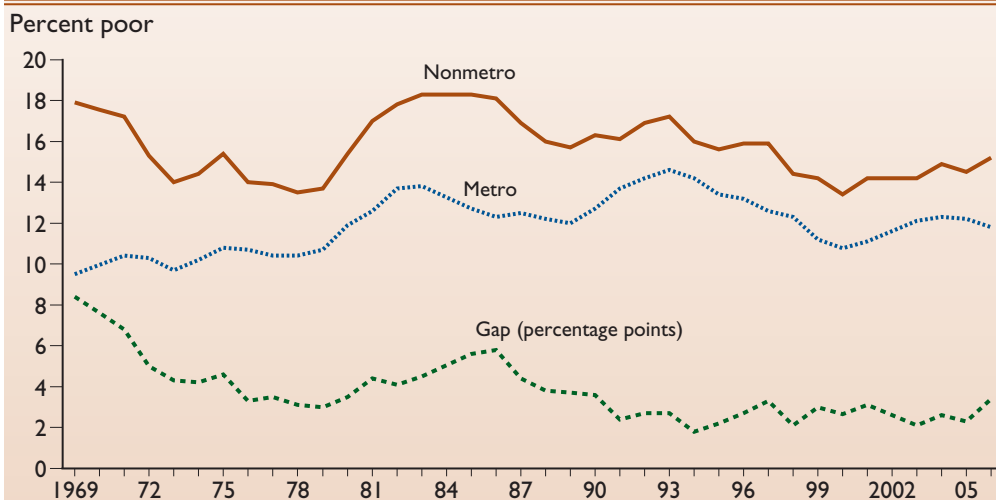
## In the Long Run

### Nonmetro poverty rates higher than metro

The nonmetro poverty rate has exceeded the metro rate every year since poverty was first officially measured in the 1960s. Generally, metro and nonmetro poverty follow the same trends over time. The nonmetro poverty rate fell through the 1970s, and then both metro and nonmetro poverty rates began to increase with the 1980-82 recession. In the early 1990s, poverty rates began to fall, but since 2000 they have begun to edge up. Poverty estimates from 2006, the most recent year available, show the metro-nonmetro gap increasing, with nonmetro poverty at 15.2 percent and metro at 11.8 percent.

**Timothy Parker,**  
tparker@ers.usda.gov

### Poverty rates by residence, 1969-2006



Note: Metro status of some counties changed in 1984, 1994, and 2004. Metro and nonmetro rates are imputed for 1970, 1984, 1994, and 2004.

Source: USDA, Economic Research Service, using data from the U.S. Census Bureau's Current Population Survey, March Supplements.